Chapter II

REVIEW OF RELATED LITERATURE

2.0 Introduction

Research is a detailed and careful study which comprises of creative and systematic work, based on the data sources and materials to establish facts and reach new conclusions. Related literature is reviewed by the individuals or researchers to analyze and visualize the scope of their proposed research study in the similar research area. Reviews about the studies provide an insight to the researcher for framing and structuring the proposed research study. The proposed research study 's design, tools for data collection, methodology of the reviewed literature enlightens the researchers mind systemizing the planning for the proposed research study. Moreover, review of literature indicates the contribution of the individuals or other researchers in the related field, which also encourages the researcher to work towards contributing in the collection of knowledge.

The review of literature forms an essential factor of any research work. It brings clarity to the research problem, opportunity in stating the objectives of research and helps in structuring the methodology, tools and technique of the proposed research study. The review of studies also provides an insight to plot out PILOT studies for the proposed research problem, where researcher basically rehearse for the main study and able to recognize the probable challenges which may arise during main research study. The review of literature provides inputs to strongly represent the rationale of the proposed study. Reviewing the literature related to proposed research study gives the researcher a confidence and motivation to plan and strategize the proposed work towards the research.

2.1 Review of related studies

Review of related studies were based on Project Based Learning (PBL) and Internship programs. PBL is a student-centered educational approach. The focus shifts from a teacher-driven method of instruction to one where the student

is empowered to conduct self-directed learning. PBL is helpful for developing long term learning skills which aims on letting students acquire interdisciplinary skills and develop behavior on the collective responsibility and cooperation as compared to traditional learning. Internship is a temporary–work placement or field training opportunity to learn work and experience field activities. In the perspective of engineering, it is seen as an effective platform for engineering students to participate through Internship or in field activities provides the students with an experiential learning experience in a professional environment in the industry.

Six of the PBL reviewed studies were conducted on the primary and middle school students, five of the studies were conducted with high school students, seventeen of studies were implemented on higher education individuals and remaining seven of the reviewed studies conducted as internship programs with higher education individuals and professionals.

Reviewed studies are broadly classified into two categories:

- Studies related to PBL
- Studies related to Internship

The review of PBL related studies have been further classified at following education levels:

- Primary and Middle School
- High School
- Higher Education

2.1.1 PBL studies conducted on Primary and Middle school students

Studies conducted on the primary and middle school students were reviewed for the proposed study and they are as follows:

Barron, 1998; Wurdinger and Carlson, (2009). According to the researchers the PBL approach started a century ago at MIT (Massachusetts Institute of Technology) USA, in 1864. The project activities at that time were making clothes, nature observing activities, carpentry, and other metal work. Sooner PBL approach was appreciated and supported by quite number of schools and teachers. Even some universities make it mandatory to finish project work before students get graduation. But some hurdles like large class sizes, limited

time, and hardcore administration structures did not let project culture flourish. So, only very less percentage of teachers adopted project-based learning in teaching methods in early 1900.

Asan, Askin and Haliloglu, Zeynep (2005) conducted a study on **Implementing Project Based Learning in Computer classroom.** This study was done to find out the development in skills such as group work and collaboration skills in a PBL computer class. 98 students from VIth grade of Koprubasi, Trabzon elementary school who enrolled in computer class were the participants of the study. Students were divided into control group (50 students) and experimental group (48 students) and were randomized to four sections because the computer suite could accommodate only 25 students. So, two sections formed the control group and other two sections (experimental group) received the project-based instruction. This research study lasted for 8 weeks. Performance test and assignment was given to students at the beginning and at the end of the study. Pre-test and post-test, group and self-evaluation forms were used to measure the results. Findings of the study reveal that when students work together in teams to create projects, they maximize their computer skills. This study also indicated that PBL improves student's collaboration and communication skills.

Gökhan BAŞ, Ömer Beyhan (2010) conducted a study on 'Effects of Multiple Intelligences supported project-based learning (PBL) on students' achievement and attitude towards English lesson'. The research was to investigate the effects of multiple intelligences supported project-based learning on students' achievement and their attitude towards English lesson. The study was conducted in 2009 – 2010 education-instruction year in Karatli Sehit Sahin Yilmaz Elementary School, Nigde, Turkey. There were total of 50 students of grade 5 which were divided in two groups as experimental and control group. The PBL program was administered for 4 weeks, Pre-test was conducted before beginning the program followed by post-test at the end of program. The statistical analysis of pretest and post-test scores reveals significant difference between the achievement level of the students. The experimental group students who had multiple intelligences supported project-based learning method had scored better than the control group students who have been educated by the traditional

language teaching methods. In addition to academic success of the experimental group students, researcher found that project-based learning made these students happy during the learning process by providing them with rich learning experiences.

Derya Baser, M. Yasar Ozden and Hasan Karaarslan (2017) conducted a study on **Collaborative project-based learning for an integrative science and technological education project.** This study aims to understand how seventh grade students perceive a collaborative web-based science project. The sample was seventh grade students aged between 12-14 from a rural K-12 school in Turkey. This study applied proactive action research method to enhance students technological and collaborative skills and to demonstrate technology integration into science coursework. The data was collected qualitatively through interview, observation forums, website evaluation rubrics. The study supported the Wolff's design features for collaborative PBL environment and it appropriately implements these features for a rural K-12 school to create digitally enriched environment. The results reveal that online tutorials, forums are beneficial for Collaborative PBL. The Interdisciplinary, collaborative PBL was efficient in exposing integrating technology practices into science as well as enhance students advanced technological and collaborative skills.

Swan, K., Vahey, P., van't Hooft, M. , Kratcoski, A. , Rafanan, K. , Stanford, T. , Yarnall, L. and Cook, D. (2013) conducted a study on,' **Exploring the Efficacy of a Cross-curricular Application of Preparation for Future Learning (PFL) by incorporating Problem-based Learning Across the curriculum.'** This study aimed to explore the applicability and efficacy of a variant of problem-based learning, and preparation for future learning approach in teaching and learning context for middle school students with literacy unit called Thinking with Data (TMD). In Data literacy program an individual asks and answer meaningful questions by analyzing the data encountered or collected. The quasi-experimental study was conducted with the sample was 576 seventh grade students from two middle schools in northeast Ohio. The students were divided into experimental (TMD group) and control group (non-TMD group) at both schools. The research study was conducted in 2008/2009 school year and TWD implementation was completed before winter

break. Data was collected in the literacy assessment of Pre-test and post-test, students' reflection on TWD, and the teacher interviews by an outside evaluator. Result show statistically significant differences between both experimental and control groups scores for Pre-test and Post-test. The participants and teachers' reflections also suggested that the PFL with PBL approach can be effectively implemented across subject areas to support the development of data literacy.

Panasan Mookdaporn Nuangchalerm Prasart (2010) had conducted the study,' **Learning Outcomes of Project-Based and Inquiry-Based Learning Activities**.' The study was performed on fifth grade students of Muangnakhonratchasima School, Amphoe Muang, Nakhonratchasima 30000 Thailand. The study was aimed to compare learning achievements, analytical skills while using Project and Inquiry based teaching methods. The sample was 88 students and were divided into 2 groups of students with 44 in each group. One group was taught with Project based learning instructional method while other one was taught with Inquiry based teaching. Pretest was conducted before the program began and was followed by post-test at the end. The evaluation pre and post-test was based on the achievement test, analytical thinking, science process skill test. Results revealed that increase in mean value of pretest to post-test for both instructional methods are very close. Students with PBL instruction's learning did not show any different learning in achievement, analytical and science process tests. The conclusion of this study was both PBL and Inquiry based learning activities were equally effective and well accepted by students. Science teachers could implement both teaching methods in organization of activities for better learning of learners.

2.1.2 Overview of the PBL studies reviewed for Primary and Middle school students

The above reviewed studies have highlighted advantages of Project Based Learning towards problem solving approach, critical thinking, personal competence level, academic and soft skills with active and overall learning of the respective course work taught.

Asan, Askin and Haliloglu, Zeynep (2005) and Panasan Mookdaporn Nuangchalerm Prasart (2010) conducted the study on elementary school

participants of PBL incorporated computer class and using Project and Inquiry based teaching methods with fifth grade students respectively. The mean scores of Pre-tests, Post-test and other data collection tools revealed that PBL improves student's collaboration and communication skills. Studies were aimed to compare learning achievements, analytical skills and the results indicated that both PBL and Inquiry based learning activities were equally effective and well accepted by students in improving learning and soft skills.

Gökhan BAŞ, Ömer Beyhan (2010), Swan, K., Vahey, P., van 't Hooft, M., Kratcoski, A., Rafanan, K., Stanford, T., Yarnall, L., and Cook, D. (2013), Derya Baser, M. Yasar Ozden and Hasan Karaarslan (2017**)** had conducted PBL interdisciplinary studies to identify the contribution of PBL pedagogy in the learning outcome. The statistical analysis of studies was conducted for the designed tools for different studies such as pre-test, post-test, interviews, feedback forms. The conducted studies results showed significant difference in mean scores of pre-tests and post-tests. The observational interviews conducted revealed positive feedback for PBL program. The academic success, efficacy of PBL and advancement in technological and collaborative skills in the participants were the achievements of incorporating PBL in these studies. The learners and teachers found themselves happy during the PBL learning program. Hence the above studies revealed that learners experience gain in learning when PBL studies incorporated in the interdisciplinary and web-based studies.

2.1.3 PBL studies conducted on High School students

PBL related research studies which were conducted with high school students at secondary and senior-secondary level had been reviewed for related literature.

Creghan, Casey and Adair-Creghan, Kathleen. (2015) had conducted a study **on The Positive Impact of Project-Based Learning on Attendance of an Economically Disadvantaged Student Population: A Multiyear Study**. The purpose of this quantitative study was to examine the effects of a project-based learning (PBL) environment on economically disadvantaged high school students regarding their attendance rates. To investigate the research design

compares two different high school campuses located in same independent school district in Texas. The first campus called Alpha is a traditional comprehensive school while other campus called Beta was using PBL environment. 65 economically disadvantaged students were randomly selected from each campus for each year. The Attendance rates from the three years under review in the study were retrieved from the TEA (Texas Education Agency) for both campuses the data were analyzed using descriptive and inferential statistical methods. The results indicated the significant difference in the attendance rates for the schools under each year of the review. Economically disadvantaged students at Beta, the campus utilizing a PBL saturated environment, attended school at higher rates than students at Alpha, utilizing a traditional instructional approach. Considering the results of this study it may also be concluded that PBL principles of collaboration, hands-on inquiry, meet the personal interests and relevancy needs of the economically disadvantaged population and therefore leading to increased attendance.

Avitz, Jason (2008) had conducted a study on **Project Based learning as a Catalyst in Reforming High Schools.** This study presents initial results from a survey of project-based learning conducted across a dozen strata of high schools including several major reform networks. This study is limited to PBL engaged high school teachers of math, science, social studies, and English subjects and who had worked in PBL activities through BIE materials. (BIE)- Buck Institution of Education. To collect the data the survey was administered using a web-based tool (www.surveymonkey.com), and customized emails using Mail Merge in Microsoft Word for reform model schools who use projects as a central instructional or for faculty who had attended workshops for BIE related materials. A random sample of 1568 was selected form 5000 teachers at schools across Ohio, New Jersey, San Diego., and 36% of 1568 had responded. Findings from survey revealed that PBL is a central element of reform and PBL helping to engage students in the community and to personalize their learning

Kartika Arum Sari, Zuhdan Kun Prasetyo, and Widodo Setiyo Wibowo (2017) had conducted a study on the **development of science student's worksheet based on project-based learning.** The research was to investigate the collaboration and communication skills of junior high school students while

working over science student worksheet prepared with project-based learning (PBL) approach. The study was conducted in April 2017 with 27 learners of Grade 7 of junior high school students. The instruments used in this research consisted of validation form of science student worksheet, the student's questionnaire response form, the form of learning process with project-based learning models, self-assessment, peer-assessment and observation sheets of collaboration and communication skills. This research consisted of four stages, define (initial analysis of learners and tasks, concepts) design (drafting instrument, materials, rough draft), develop (validation by experts), and disseminate (final stage of implementation). The data were analyzed using qualitative and quantitative analysis. Qualitative analysis for the data of worksheet's validation and students' response. Quantitative analysis for the self-assessment, peer assessment and observation sheet data of collaboration and communication skills training. Students' responses for worksheet validation reveals that the worksheet prepared on project-based learning approach was reasonable. The significant difference between before and after worksheet scores showed the significant improvement in collaboration and communication skills of junior high school student.

Shi-Jer Lou,Yung-Chieh Chou,Ru-Chu Shih, Chih-Chao Chung (2016) had conducted the study to explore the effects of **Project Based Learning (PBL) in STEM activities for junior high school students.** Researchers analyzed the PBL STEM learning experience and how the PBL STEM experience learning influenced the creativity of junior school students in STEM activities. The study was conducted with 60 ninth grade students which were selected per their last year's academic achievements. The STEM project-based learning activities were carried out in five stages, preparation (for one week), implementation (for two weeks), presentation (for one week), evaluation (for one week) and correction (for one week). The two research tools 'Interview outline' and 'Creativity Tendency scale' were used to collect data in the study. The interview outline consisted of the design ideas, group interaction, problem-solving models and the STEM learning and application in the STEM activities. The Creativity Tendency Scale covered four aspects of adventurousness, curiosity, imagination, and challenge. Pre-test and Post-test was conducted, and the

respective scores were used to analyze the affective development of creativity. The significant difference in the pre-test and post-test scores and the analysis of students' feedback revealed that PBL involved the students in the repeated PBL processes of preparation, implementation, presentation, evaluation, and correction which greatly improved the students' ability in design, production, problem-solving abilities, and cultivation of their creativity.

Mioduser David, Betzer Nadav (2007) had conducted the study on, 'T**he contribution of Project-based-learning to high-achievers' acquisition of technological knowledge and skills.'** This study examines the PBL pedagogy's contribution in high school students to perform high, bringing positive attitude and improvement in their ability to implement solutions for technological problems. The study was performed with 120 technological high school students at Israel. Students were divided into two groups 60 students, subdivided into three groups for experimental and 60 students which are later subdivided into three groups for both control and experimental group. Pre-test was conducted for the group before the program begins. Experimental group was taught with 6 hours with PBL integrated course and 3 hours of traditional learning methods, while the controlled group students were taught only traditional methods like lectures, homework, and assignments. At the end of course a final project was submitted by both the groups. The quantitative analysis was done for the pre-test and post-test scores while qualitative analysis was done for the project based on design skill acquisition and performance of experimental group. The results revealed that experimental group which was taught with PBL showed 30% increase in scores as compared to control group scores. The analysis of projects reveals that PBL or experimental group's knowledge usage pattern, design skill acquisition, performance and meaningful aspects in the project was way better than the control group students. Findings showed that PBL approach had proved it as a powerful instructional model allowing students to acquire in depth knowledge and high learning achievements.

2.1.4 Overview of the PBL studies reviewed for High school students.

The above reviewed studies have revealed the benefits of incorporating Project Based Learning program in the courses for high school level learners.

Studies showed learners gain in acquiring knowledge, improving academic skills, soft skills and developing problem solving skills.

Creghan, Casey and Adair-Creghan, Kathleen. (2015) Avitz, Jason (2008) conducted on reforming high schools by incorporating PBL pedagogy as a catalyst. Both studies worked towards engaging high school students through PBL related activities and elevating their interest in collaboration and learning. Findings from the survey and data collection tools revealed that the PBL stood out as a reforming tool to revert learners' interest towards collaboration, personal and community learning. The high attendance rate and students' engagement in learning had shown learners increase in interest in PBL incorporated program.

Mioduser David, Betzer Nadav (2007), Kartika Arum Sari, Zuhdan Kun Prasetyo, and Widodo Setiyo Wibowo (2017) examined and identified that PBL pedagogy contribution in bringing positive attitude and improvement in learners problem solving abilities, collaboration and communication skills for worksheet prepared with project-based learning (PBL) approach. Shi-Jer Lou,Yung-Chieh Chou,Ru-Chu Shih, Chih - Chao Chung (2016) analyzed that PBL STEM experience learning influenced the creativity of high school learners. Analysis of the above PBL incorporated studies revealed that learners were involved in the repeated process of preparing, implementing, evaluating, and presenting their work or models which contributed to improvement of students learning abilities significantly. And learners interest inclined towards gaining knowledge, positive attitude, creativity, problem solving and communication skills. The before and after scores showed significant difference and reveals high learning achievements. Hence, the Problem based learning approach was reasonable and the implementation of it brought great benefits for high school learners.

2.1.5 Studies conducted on Higher Education

PBL related conducted studies were reviewed by the researcher at the higher education level for this study.

Hashim, Roslan, and Azizi Mohd Din, Mokhtar (2009) had conducted a study on **Implementing Outcome Based Education Using Project Based Learning**

at University of Malaya. In this study, the authors evaluated the implementation of a Project Based Learning (PBL) in the development of student's soft skills as well as technical or professional competences. The research question is to find out the suitability of PBL in achieving the desired learning outcomes. A survey camp was offered for second year civil engineering undergraduate students. During this two-week engineering surveying camp, students were divided into four groups of six-seven students in each group, and they performed actual field surveying practices under the supervision of their instructor. Results of the conducted program were measured based on the group reports, the survey plan and the conceptual design plan submitted by participant students at the end of two-week camp. It was found that the outcomes for the hard skills, engineering survey and conceptual engineering design, were achieved through with lesser degree for the engineering design. Regarding the soft skills, the students benefited from the two-week course by showing a marked enhancement in their personal competences level. Researcher recommended considering the suggestion of offering the survey camp upon the completion of second year of undergraduate program as the students had learned and completed theoretical course material related to engineering surveys by the time, they go for Engineering Surveying Camp.

Pee, S.H. and Leong, Helene (2005) had conducted a study on Implementing **Project Based Learning using CDIO concepts.** This research study provides information on how PBL-CDIO (Create, Design, Implement and Operate) will motivate the students to acquire knowledge, people and process skills and values and ethics. A Pilot program incorporating CDIO concepts with PBL was implemented for class of 20 students at Singapore Polytechnic College in 2003. The students were divided into 6-7 groups of 3-4 students in a group. The project was assigned for 7 weeks, and they progressed from problem identification to development of solution. At the end of 7 weeks all projects were assessed by the faculty as per designed rubric. The approach was found to be effective in motivating students to acquire domain knowledge and problem-solving skills. It promoted a learning culture where dispositions and skills related to learning are valued. Researcher also found it as a vision for new education model for the 21st

century which implements experimentation and exploration of new methodologies in teaching and learning concepts.

Lee, Jean S., Blackwell, Sue. Drake Jennifer, A. Moran, Kathryn (2014). had conducted a study **Taking a Leap of Faith: Redefining Teaching and Learning in Higher Education through Project-Based Learning.** This study examines two aspects of teaching with a project-based learning (PBL) model in the higher education settings, faculty definitions of PBL and faculty PBL practices. A phenomenological inquiry approach was adopted for this study. Participants were faculty members from University of Indianapolis, a comprehensive institution who had attended the PBL - professional development (PD) workshops. Eight faculty members from a variety of academic disciplines accepted the invitation to participate in the study with the experience of 3-16 years in higher education instruction. Data was collected by video recorded interviews before PBL implementation, survey's on PBL unit faculty's planning to teach, video recording during PBL implementation and video interview recorded after PBL implementation. Researchers analyzed the data and the study results revealed that the PBL implementation was a challenge for higher education faculty to shift from traditional way of instruction to PBL method of instruction. Despite the challenges the participant faculty felt that it's worth the time and effort for the attained benefits of student learning which had convinced and made them to shift to PBL instruction. Recommendations from researcher was the need of substantial training on PBL instruction for faculty and ongoing professional development will help to develop the faculty as PBL practitioner.

Gavin, Kenneth (2011-2012) had conducted a study on **the Case study of a Project-Based Learning Course in Civil Engineering Design.** This study discussed the development of PBL design course in Civil Engineering at the University College of Dublin. The objectives of the study are to identify the most appropriate form of PBL in Civil Engineering, demonstrate the design and implementation of a PBL course and illustrate how evaluation can be used to determine the effectiveness of implemented PBL. The students' participants were students who had completed 3 years in civil engineering course work. The PBL module represents 33% of credits for first semester of master's in civil

engineering students. To encourage diversification and contribute to a real-world feel, the majorities of problems were set by the experts from industry and are based on the current projects for this course module. The module employs group work and weekly presentations by students. Assessment incorporated both student surveys on Likert Scale and evaluation of the course by group marking and individual open book exam. The survey was run at the end of two academic semesters. The total number of students who completed the questionnaires was 144. The survey clearly demonstrated student satisfaction with the PBL process and that they recognized that key skill required by industry such as group work, time management and the development of technical competence were enhanced. From an instructor's perspective the adoption of PBL allowed the use of open - ended questions which were useful in testing students understanding of material and PBL process significantly enhanced increased staff-student interaction.

Lee, Peiyu (2010) - had conducted the study to find out **The Impacts of a Project-Based Research Course: A Mixed Method Survey of Students, Alumni, and Teachers in Li-Shan High School, Taipei, Taiwan.** The purpose of this study was to examine the impact of the Project-based Research course from the perspectives of the current students, alumni, and teachers. The Li-Shan High School (LSHS) high school incorporated traditional education and project-based learning models as their teaching methods. The participants of this study included three groups. The 123 second year students of LSSH, 106 Alumni of LSSH, 20 current teachers who previously taught in the Project-based Research course. Students were experiencing traditional classroom and a project-based research methods class simultaneously. Data was collected quantitatively and qualitatively by conducting survey which includes Likert scale and open-ended questions. Findings revealed that current students and alumni stated that the Project-based Research course provided them an opportunity to develop more presentation and communication skills, knowing how to learn, and critical thinking in addition to academic skills as compared to the traditional education environment. Alumni highlighted that the skills they had learned in high school that helped them to adapt to college life easier. Teachers perceived that the

students developed more academic, life skills and personal qualities as a result of participating in this course.

Gulbahar, Yesmin and Tinmaz, Hasan (2006) had conducted a study on **Implementing Project-Based Learning and E-Portfolio Assessment in an Undergraduate Course**. The purpose of this study was to explore the analysis, planning, design, development, implementation and evaluation issues, and processes that learners encounter in a project-based learning environment by implementing project-based learning by utilizing e-portfolio assessment. The participants of the study were senior year pre-service teachers' small-scale classroom (N = 8). In the Department of Computer Education and Instructional Technology in the Faculty of Education at Baskent University, Turkey. Data was collected in the form of semi-structured interviews and Instructor and Course Evaluation Questionnaire. Satisfactory results from study had encouraged to apply project-based learning to larger groups. Use of e-portfolios is favored by all students, and it demonstrated a learning-centered model for teacher candidates. Pre-service teacher participants reports that their teaching methodology was enhanced and encouraged them to apply project-based learning in their future career.

Yam, Lee Hong Sharon and Rossini, Peter (2010) conducted a study on **Implementing a Project-Based Learning Approach in an Introductory Property Course.** This course work examines the challenges and advantages of implementing PBL in Introduction to Property and Valuation course at the University of South Australia for students enrolled in the Bachelor of Business (Property) program. The enrollment for course work can be done as internal and external/online class students. The project is broken down into a series of smaller tasks to make the overall project more manageable for a semester. An initial open-ended questionnaire survey to evaluate the implementation of PBL was carried out in week 6 of the semester and 28 of 36 internal students while only five of the 12 external students did provide written feedback. At the end of study period student's feedback is used for course evaluation and staff evaluation of teaching course material on Likert scale and with open questions. Academic achievement of students is measured by the assessment of the submitted project at the end of semester. Findings of the study revealed that PBL

is a teaching approach that has significant potential to transform teaching from passive to active learning. The experience of the introduction of PBL to an introductory property course has resulted in positive outcomes such as motivation, inspiration and some challenges like workload issues, teacher's content knowledge, and lack of experience of field work for both students and staff.

Turns, Jennifer, Cuddihy Elisabeth., Guan, Zhiwer (2010) conducted a study **on, I thought this was going to be a waste of time: How portfolio construction can support student learning from project-based experiences.** This study examines and explores the potential for portfolio construction to be used as an activity to enhance student learning from project-based experiences. Study was conducted in an upper-level undergraduate Mechanical Engineering class where students participated in a term-long project, designing, and manufacturing a working Stirling engine. The course syllabus indicated that each student would be required to submit a portfolio at the end of the eleven-week term and would be graded only on basis of completeness. Thirteen students were selected for interviews based on their responses across the survey questions from 35 students who submitted their portfolios. The open-ended interviews were conducted approximately one to two months after the students received their final grades for the class. A research associate and who was not a member of the Mechanical Engineering Department, conducted all thirteen interviews. Data was analyzed on the three dimensions effort, knowing and value. Findings indicate that the unique contribution of a portfolio assignment provided students with an opportunity to engage in types of thinking and knowing that may receive little attention in normal school activity.

Mergendoller John R., Maxwell, Nan L., Bellisimo, Yolanda (2006) conducted the study on **The Effectiveness of Problem-Based Instruction: A Comparative Study of Instructional Methods and Student Characteristics.** This study compared the effectiveness of Problem based learning (PBL) and traditional instructional approaches in high school of large metropolitan area in Northern California for macroeconomics class. Five veteran teachers 2 from urban and 3 from suburban had participated in the study. Each teacher was teaching a PBL Instruction and traditional learning class. Independent-samples

t-tests were used to examine whether students in the PBL and traditional classes showed statistically significant differences in their verbal ability, interest in learning economics, preference for group work, and problem-solving efficacy. Data was collected from the 246 students who completed the Independent-samples t-tests were used to examine whether students in the PBL and traditional classes showed statistically significant differences in their verbal ability, interest in learning economics, preference for group work, and problem-solving efficacy. Overall, PBL was found to be more affective in instructional approach, for students with average verbal ability, more interested in learning economics and most and least confident in their ability to solve problems.

Dole, Sharon., Bloom, Lisa., and Doss, Kristy K., (Western Carolina University) (2017) this study was conducted on **Engaged Learning: Impact of Problem and Project Based Learning with Elementary and Middle Grade Students.** This study examines the effects on student learning and motivation as a result of teachers using problem-based and project-based learning. Participants had taken a hybrid course consisting of four weeks online followed by a one-week intensive field experience facilitating problem-based and project-based learning with children in grades one to nine. Qualitative study was done, and Data was collected in three ways: structured interviews with 36 teachers completed in-depth follow-up phone interviews with four of the teachers; and observations of teachers during the week of field experience. The findings suggested that Problem and Project based learning provide opportunities for student choice, self-regulated and independent learning like developing rubrics and timelines and present problem/ project outcomes in every stage of the learning process.

Mary C. English, Anastasia Kitsantas (2013) conducted study on **Supporting student self-regulated learning in Problem and Project Based Learning** incorporates real-world, student-directed projects on the one hand and a combination of project-specific performance tasks and more general ability measures on the other This study, which was conducted by SRI International, reports on a five-year evaluation of the Challenge 2000 Multimedia Project in California's Silicon Valley. To assess the effectiveness of these varied experiences, SRI staff gave students an additional project and observed how

they went about completing it. Students in both project and comparison classrooms were asked to develop a brochure, targeted at school officials that would inform people about the problems faced by homeless students. Students in the Multimedia Project made the same progress as did students in the comparison classes on standardized tests of basic skills.

Anabela C. Alves, Celina P. Leão, Francisco Moreira and Senhorinha Teixeira (2004-2005) (2016 - 2017) had conducted the study **on the effects of PBL on development of social skills on Industrial engineering and management program first year students** (IEM1) at University of Minho, Portugal. Researchers investigate the effects of project-based learning (PBL) on development of social skills of first year students by promoting 4C skills - Critical thinking, Communication, Collaboration, and Creativity. The instruments used for this study consists of a questionnaire on the development of social skills for First year students which were evaluated on based of Likert scale and interviewing of a group of recently graduated currently working Industrial Engineers. The project was held in the first semester of 2016–2017 and had 49 students enrolled and 32 answered the questions. The class was divided into six teams. The first semester of the IEM program includes six Project Supporting Courses (PSCs) 1) Introduction to Industrial Engineering and Management (Topics of IEM); (2) Calculus; (3) General Chemistry; (4) Algorithms and Programming; (5) Linear Algebra and (6) Interdisciplinary Project on Industrial Engineering and Management. The PBL-IEM1 lasts for 20 weeks (15 weeks of contact work), 2 weeks for Christmas break, and the remaining weeks are used for assessment purposes and final examination. The questionnaire used on instrument 1 was a part of a larger annual questionnaire on evaluation of the PBL methodology and instrument 2 was interviews of recently graduated professionals on the effects of PBL on the acquired social skills development. The Likert scale result mean was greater than 3 for all the sections of Learning and skills development, Teamwork and PBL as teaching/learning methodology. The qualitative analysis recognized the acquired competences like capability to lead projects, produce effective work within multidisciplinary teams, helped the recently graduated professionals in dealing with conflicts, providing effective oral and written communication,

capability to adapt to different work environments, assuming responsibilities during project development, in the usefulness and applicability in their behavior and daily professional activities.

Levitt, S., McKeage, A., and Rangachari, P. K. (2013). conducted a study on a problem-based learning course in medicine. The investigation study was done for a **Problem based learning (PBL) elective course, 'Drugs, Devices and Desires'**. with fourth year Bachelor of Health Sciences program at McMaster University. This course had two major components PBL and an Independent Inquiry element. The sample was 52 students who took this course over a period of five-year period (2008-2012) though it was sole tutor for all the students over 4 years. The PBL data was collected as writing 3 reports for the material gathered by the students for given three problems and for the inquiry component students submitted the accumulated work for 70 marks from given options of learning logs (10 marks), book reviews (20 marks each), standard essays (15 marks each), conversations (25 marks), targeted oral exams (25 marks), and archival research (30 marks). The data analysis was done from the results gathered from 36 students. Results revealed that overall students had explored medical technologies from multiple perspectives and assessed them in different ways. Self-directed learning and motivation to dig more deeper into resource materials was the opportunity provided by independent inquiry projects. The scores attained by students is quite high and the discussions were very lively. The student rating for this elective course is 9.5+ out of 10. Some limitations were also suggested by the researcher as students got to know about the detailed history of the disease and this bias cannot be covered as of short period of time for course completion but was another way to aware the students of the problem.

Musthak Ahmed Syed, **G. Madhuri, Reddy M. Sampath, Condoor Sridhar S. (2018)** conducted a study on, '**Skill development in freshmen by incorporating project-based learning for, "Introduction to Engineering" course'** at SR engineering College, Telangana, India. This course introduces engineering design process which helps in understanding multidisciplinary concepts for various disciplines. The sample of thirty students were enrolled in this course work were taught by 2 faculty members and students were divided into 4 members per group. The main object of introducing this course is to

develop creativity, teamwork, critical thinking, and leadership skills. This course curriculum includes topics like engineering process, opportunity identification, conceptualization, skill development and finally to develop a product prototype. During performing this activity brainstorming sessions were conducted for interaction and discussion among peers. SCAMPER - (Substitute, Combined, Adopt, Modify, Minimize, Maximize, put together, Eliminate, Rearrange) pattern was also adopted to bring modifications existing product. Students were to present their innovative ideas through effective communication and team spirit. The effectiveness and impact of each group was assessed and evaluated by faculty designed rubric. Student feedback form was developed to check the validation of various introduced parameters like student ability, teaching methodology, skill development curriculum, student expectation, PBL activities, faculty-students interaction, and overall response for PBL introductory course. The overall results reported the positive response of students towards the PBL introduced course. The conclusion of study was that Introduction to Engineering course with PBL pedagogy had been proven effective improvement in skill development, soft skills, critical thinking, problem solving and creativity among students.

Fernanda, Leite (2016) had conducted the study on, '**Project based Learning in a building Information modelling for Construction Management Course.'** Building Information Management (BIM) course required more emphasis on learning BIM as process Improvement methodology rather than just technology. The sample of students were 145 students enrolled in BIM course at the University of Texas, Austin. This course was entirely designed with PBL approach, the assignments given to students were mini projects to be completed in an assigned group with team members, which were mentored by industry experts to develop modules for real world problems. Course Instruction was structured with lectures, individual learning, software tutorial, team-based learning with hands on experience and group presentations and discussions. Rubric for competent, somewhat competent, or non-competent group was based on the completed assignments or mini projects. The assessment of mini projects was defined on the type of problem, activities planning for sorting solution to problem, schedule of preparing module and project presentation. Peers and

Instructor assessments were also conducted at every level to get the feedback on Likert scale. Peer assessment gave the instructor an opportunity to assess individual behavior of student while working in a team, while Instructor assessments gave instructor an insight to instructor's guidance and involvement in provided assignments and the needed areas of improvement. The results of the rubric reported that 77% of students done quite well and falls in the competent and somewhat competent category. The average rating for Instructor's contribution in mini project work on the Likert scale was 4.7 out of 5. Students appreciated the curriculum structure of BIM course where they can interact with industry experts and work on real world problems. As result BIM course with PBL modular structure was successfully implemented and well received by students and can be considered a successful education experience for PBL based BIM course in construction management program.

Rodríguez González, C.A., Fernández Batanero, J.M. (2015) had conducted a study, 'A r**eview of Problem Based Learning applied to Engineering.**' International Journal on Advances in Education Research The study focused on the adoption of PBL for engineering courses teaching at the school of Engineering of the University of Huelva, Spain. The curriculum for this study was based on the practical aspects of design and implementation of PBL as to compare students learning with PBL approach to traditional learning. The study was performed with the enrolled students in construction engineering for academic year of 2013-14 and 2014-15 at University of Huelva. The students were divided into two groups, one with PBL instruction and other group was taught by traditional teaching methods. The pre-tests were conducted before the instruction session begins followed by post-test after the completion of course. Quantitative analysis of test was done while qualitative analysis was done for conducted individual interviews. The significant difference was found in the mean scores of both groups. PBL instructional group had performed better and showed improvement in the problem-solving approach for given problems in the test as compared to traditional teaching methodology group. Interviews analysis revealed that students tended to show better creativity in tackling problems and finding a solution with PBL methodology. The students mentioned about role that student- teacher interaction plays in developing

confidence and leadership qualities in them. The findings of this study showed that PBL contributes to gaining knowledge along with developing skills like problem solving, better creativity and leadership skills.

Henry Holly R., Tawfik Andrew A., Jonassen David H., Winholtz Robert A., Khanna Sanjeev (2012) had conducted the study, **"I Know This is Supposed to be More Like the Real World, But . . .": Student Perceptions of a PBL Implementation in an Undergraduate Materials Science Course.** This qualitative case study examines the different phases of implementation of PBL approach to identify the improvement areas in the curriculum. The implementation of PBL was done in two phases, the improvement area in first phase was identified before commencing the second phase of PBL implementation. The first implementation was with the sample was 54 junior mechanical engineering students enrolled in spring semester of Engineering material science at Midwestern University, USA. The curriculum of Material science course was redesigned with first implementation of PBL approach to seek, solve, and present the solution of the problem. Students were divided into 10 teams and 5-6 students in each group with assigned group leader by a team. All the teams were also instructed to rotate their duties as steam member for better coordination. Eight problems were assigned, two course instructors will serve as facilitators for students throughout the semester for PBL approach while students did appear for traditional examination methodology at the end of semester. All the teams worked through planned modules, where students solved the problem, completed the schedule planning worksheet, drew flow charts, shared trouble shooting experience and prepare report for the assigned problems. Interview were conducted with team group leaders after completing first and last module of PBL course. The class observations during PBL sessions were done by two graduated assistant researchers and tenured faculty member. Qualitative data analysis was validated by comparing class observations and responses to conducted interviews. The data was compared for its module and last module interviews and class observations as to find out how students' perception had changed for the revised curriculum of Engineering material course. Results revealed that student did not find connection with PBL curriculum and traditional way of semester end exams. Students were not theoretically prepared

for the exams as very few traditional lectures were held during the semester. Students were frustrated as of the lack in the basic theory knowledge which hinders the meaningful interaction with the facilitators or instructors in terms of course matter. Few of the students reported enjoying problem solving activities more than lectures but emphasize that more lectures would have helped them to prepare for semester end exams as well. Students did not rotate their duties, so some team members were not satisfied and comfortable working in groups. Several student participants suggested on the need of reformation and proper reinforcement of resources and program to be well accepted by the students. Overall findings revealed that PBL experience was not completely negative in the minds of students, but the implementation of program did not go well. Conclusion of the study was that the implementation of PBL approach in any course curriculum must be planned well for significant improvement in desired outcomes. Hence, this study concluded that PBL approach implemented for engineering material since course needs significant improvement in methodologies and evaluation processes to provide maximum benefit students.

Bilgin Ibrahim, Karakuyu Yunus, Ay Yusuf (2014) had conducted the study on, "**The Effects of Project Based Learning on Undergraduate Students Achievement and Self- Efficacy Beliefs Towards Science Teaching".** The purpose of this study is to investigate the PBL pedagogy effects on set of seven classes of students enrolled in science teaching course in a Primary school education Department of a State University in Turkey. The sample of 66 students were divided into experimental and controlled groups with 33 in each group. The Pretest and Post-test was conducted which was based on the Science and Technology Teaching Achievement Test (STTAT) and Self-Efficiency Belief Scale (SEBS). The experimental and control groups had classes for 3 hours a week with total of 27 hours over 9 weeks. The PBL was briefed to experimental group students and were divided into 5-6 members in each group. The PBL methodology curriculum was planning a group project, working on progress of projects, on the science technology topics to be taught to fifth and sixth graders, putting the presentation together. The group performance was given feedback from the researcher and other fellow students. The traditional teaching for control group was explained to students to how to use relevant

theories. Data collection was done by pretest, post-test, and open-ended interview questions. The interview form questions were developed based on literature survey and two science education evaluation experts. Data analysis was done qualitatively for open ended interviews and quantitively for evaluation tests. The results reported that treatment group average test scores for STATT and SBES evaluation tests were higher than the control group scores. Treatment group students responded positive in interviews for PBL pedagogy, expresses PBL approach when applied with theory had enhanced their learning levels. Though initially students felt anxious while working collaboratively in a team while building projects but had developed the soft skills like teamwork, time management and cooperation with team members. Study findings revealed that the undergraduate's opinion about their fear and nervousness about method and techniques of PBL implementation but mentioned about gained competence in teaching 4th and 5th year topics of the science and technology teaching courses. Students felt the teaching materials prepared with PBL method increase their performance and self-efficacy beliefs about the science learning and teaching with PBL methodology as compared to the students instructed by traditional method.

Thomas, John W. (2000) did, **A Review of research on Project based Learning**. This inclusive review examines research related to a teaching and learning model popularly referred to as Project-Based Learning (PBL). Some of the brief reviews were:

Meyer, Turner, and Spencer (1997). Challenge in mathematics classroom: Student's motivation and strategies in project-based learning. In investigation focused on learning styles, they divided a group of fifth- and sixth-grade students into challenge seekers versus challenge avoiders based on surveys and interviews. Meyer et al. hypothesized that challenge seekers who have a higher tolerance for failure, a learning (vs. performance-focused) goal orientation, and higher than average self-efficacy in math would approach Project-Based Learning with greater interest and mastery focus than would challenge avoiders. Although there were some indications that individual differences in students' motivation patterns relate to differences in PBL behavior (e.g., tolerance for error, persistence, flexibility).

Barron et al. (1998) conducted a study **on Doing with understanding: Lessons from research on problem and project-based learning** take the position that learning appropriate goals can be maintained by introducing explicit design requirements within the problem or project that prompt students to generate and pursue productive questions. Barron et al. describe an intervention research study conducted by Petrosino (1998) in which an enhanced project about rocketry was compared to a more traditional rocket project. In both projects, students were encouraged to build and launch rockets. In the traditional project, students were called upon to build, launch, and test a rocket. In the enhanced project, students were asked to submit design plans to the National Aeronautics and Space Administration to match a set of design specifications. These specifications were to propose and conduct rocketry experimentation on the relative influence of paint features, external fins, and type of nose cone on the attained height of the rocket launch. Because of this added requirement, students in the enhanced condition ended up learning more about rocketry and controlled experimentation than students in the traditional classrooms.

Boaler (1997), conducted a study **Problem based learning in Mathematics** in her investigation of mathematics learning in two contrasting schools, found differences between girls and boys in their preferred mode of learning and in the extent to which they could adapt to different forms of instruction. Girls were found to be more disaffected by traditional instruction than boys and showed lower achievement than a matched sample of girls taught with project-based methods. Boaler suggests that girls seem to prefer being taught using methods that stress understanding vs. memorization and learning procedures. Boaler suggests further that exposure to project-based methods might raise the mathematical achievement of all students, especially girls.

English Mary C., Kitsantas Anastasia (2013) had conducted the study on '**Supporting Student Self-Regulated Learning in Problem- and Project-Based Learning (PBL). Interdisciplinary Journal of Problem-Based Learning Volume 7 | Issue 2 Researchers** had created a theoretical model of relationship between self-regulated learning (SRL) and Project and Problem based Learning. The developed model focused on the learning environment, teaching practices and to support and encourage students self-regulated learning.

Researchers had reviewed the literature on various PBL studies, which revealed that students had gradually developed the potential for SRL skills. Researcher found that very few studies had been conducted on how the SRL activities can be well implemented for effective results in PBL courses. Hence the Researchers proposed theoretical model with three PBL phases. PBL phase 1- Project on Problem Launch, PBL phase 2-Guided Inquiry and product Solution, PBL phase 3 - project / problem conclusion. The hypothetical example was setup where teacher's role in setting up the inquiry and to create the environment and allow students to strategically plan and conduct the inquiry. Phase 2 learning included interactive inputs for peers and teachers for gathering information, making meaning, testing and application of logic and reasoning. Phase 3 included the formal session of self-evaluation in SRL model. Students share their project and implement ideas in the project. This model illustrated that the self-regulatory processes were planned to develop learning environment, teaching practices and SRL among students. Conclusion of this theoretical model study emphasize on that student must take responsibility for their own learning process which will help them in setting goals, monitoring progress and engage themselves in self-reflection.

Beddoes Kacey D., Jesiek Brent K., Borrego Maura (2010) had conducted the study on, "**Identifying Opportunities for Collaborations in International Engineering Education Research on Problem - and Project-Based Learning".** The research study was conducted to develop a theoretical model and provide recommendation by doing meta-analysis of large collection of conference papers, e-journal articles to report on research trends in PBL. The research questions addressed by researchers were global state of Engineering education research on PBL and what collaborative configurations can help to support cross-national research in PBL education. Researcher had conducted an in-depth bibliometrics analysis of engineering education journal articles and conference papers published from 2005-2008. The articles were collected and identified by keywords problem based, project based and PBL. From 885 reviewed publications in engineering education data base, 105 were determined to be about PBL. Data suggested that large number of PBL articles were published at USA, Australia, and Denmark. The PBL approach had been

recognized in Australia and seamark almost a decade ago. Research reveals very few articles related to PBL were published from Asian countries. The Multinational collaboration articles were only 3.8% of 105 publications selected. The researcher proposed a theoretical model in which the challenge of gap of intervention and implementation of existing PBL can be bridged by successful collaborations of researchers, as an expertise while PBL instructor as a facilitator. This collaboration will put a better picture in better assessing student's knowledge and skill acquisition with PBL approach program. Researcher emphasized on the type of model which highlighted the trust, respect, and mutual understanding for successful collaboration. Researcher suggested that the PBL related questions, theories and implementation methods can be better relevant applicable and must be developed per different geographic contexts. Findings revealed the systematic development in PBL research and practice contributed to productiveness and adjacent in engineering education.

2.1.6 Overview of impact of PBL studies at higher education level

Studies reviewed above were conducted on PBL pedagogy for higher education and had investigated the contribution of PBL in gaining knowledge, improving technical competence or field knowledge, soft skills such as teamwork, problem solving, time management, critical thinking, decision making and communication skills at the higher education level. Pee, S.H. and Leong, Helene (2005), Hashim, Roslan, Azizi Mohd Din, Mokhtar (2009), had conducted the study by implementing PBL using CDIO (Create, Design, Implement and Operate) concept. Musthak Ahmed Syed, G. Madhuri, Reddy M. Sampath, Condoor Sridhar S. (2018), introduces PBL approach engineering design process which helps in understanding multidisciplinary concepts for various disciplines. The above studies had implemented PBL in various ways and identified PBL's contribution in learning and development of soft skills. Studies result showed that students had appreciated the curriculum structure where they can interact with industry experts and work on real world problems. Engineering course with PBL pedagogy had proved effective improvement in skill development, soft skills, critical thinking, problem solving and creativity among students.

Anabela C. Alves, Celina P. Leão, Francisco Moreira, Senhorinha Teixeira (2016 - 2017) Dole, Sharon., Bloom, Lisa., and Doss, Kristy K., Levitt, S., McKeage, A., and Rangachari, P. K. (2013)**,** study's findings revealed that Problem and Project based learning in different areas provided similar benefits like self-regulated and independent learning, developing timelines and present problem / project outcomes in every stage of the learning process which helped in career opportunities.

Lee, Peiyu (2010) Yam, Lee Hong Sharon and Rossini, Peter (2010), Mergendoller John R., Maxwell, Nan L., Bellisimo, Yolanda (2006), conducted studies which examined and identified the positive impact of introducing PBL with different courses. Study's findings expressed that PBL program participants scored better as compared to the control group.

Henry Holly R., Tawfik Andrew A., Jonassen David H., Winholtz Robert A., Khanna Sanjeev (2012**)** reported a study which revealed the dissatisfaction of students with the implementation and management of PBL program. Students identified the PBL program as beneficial but unable to acquire the expected benefits as program lacks in proper implementation of program.

Boaler (1997), Lee, Jean S., Blackwell, Sue., Drake Jennifer, A. Moran, Kathryn (2014), Rodríguez González C.A., Fernández Batanero, J.M. (2015), studies compared the traditional way of teaching with PBL instruction. The findings of the studies inclined more towards PBL instruction as it is student centered and project driven program. The active participation and interaction of both instructor and student had built good confidence and leadership qualities in the learners. The better academic achievement of the PBL students as compared to traditional instruction helped effectively in motivating students to acquire domain knowledge and problem-solving skills. Beddoes Kacey D., Jesiek Brent K., Borrego Maura developed a theoretical model which identified the gap and challenges with the implementation of PBL program. The findings of the study revealed that PBL program proved more successful and better implemented with the collaborations of researchers from different areas.

Hence, conclusion of the above reviewed studies revealed the systematic development and implementation of PBL programs had proven the contribution in improving technical competence or field knowledge, develop soft skills like

teamwork, time management, problem solving, decision making, critical thinking and communication.

2.2 Studies conducted on Internship program

A total of seven studies on internship were reviewed by the researcher for this study.

Skledar Susan J., Martinelli Barbara, Wasicek Kelley, Mark Scott, Weber Robert J. (2009) had conducted the study, **"Training and recruiting future pharmacists through a hospital-based student internship program"** with Pharmacy students at The University of Pittsburgh Medical Center (UPMC). This study investigated that the implemented 4-year, structured pharmacy internship program at UPMC prepared the interns for future employment, professional growth and retention of student at UPMC after graduation. The 8 interns were trained through hands on learning at hospital pharmacy operation, practice on variety of sites, and working on project in intern's specialty area with Pharmacist. The success of program was measured by the employability skills of these interns. The incorporated and implementation of internship program was successful as four of these interns were employed by UPMC as hospital pharmacists and another pursued in postgraduate residence program at UPMC. Hence the internship program resulted in successfully training the interns and also the retention of the interns as Pharmacists at UPMC.

Vahidi R.Gh, Daneshkhah N., Araks M., Koushavar Hossein Mohammadpourasl A. (2003) Had Conducted The Study, "**Nursing Students And Instructors Viewpoints Regarding Professional Abilities Of Students In Internship Program At Tabriz University Of Medical Science"**. This study investigated the skills gained by students during their internship program. The participants of this study were 74 Bachelor's in nursing program attending internship program students and their 33 instructors of Tabriz University of Medical Sciences. The data was collected in the form of questionnaire on Likert scale and other 96 questions were distributed as administered. The questionnaire was based on certain verticals like patient care, services for patients, patient safety, management skills quality improvement and patient education. The descriptive analysis was performed, the statistical results show significant

difference between students and instructors' viewpoints on gaining the level of professional skills. Findings revealed that achieved professional abilities in all dimensions were not satisfactory. The conclusion of study expressed that this internship program lacked in providing benefits as of mismanagement and inappropriate stewardship. The implementation of program is as important as introducing it in the curriculum. This study provided the insight for structured implementation and evaluation of internship programs.

Matthew, S.M., Taylor, R.M. and Ellis, R.A. (2012) had conducted the study on, **"Relationships between students experiences of learning in an undergraduate internship program and new graduates' experiences of professional practice"** This study investigated the relationship of final year internship program experience of clinic-based learning (CBL) with new graduate Veterinary professional practice (VPP). The 41 participants of the study were final year students of Veterinary undergraduate program at University of Sydney. The data was collected in the form of interviews and experiences of 41 interns for CBL program and experiences shared by 22 new graduates practicing as Veterinary professionals respectively. The questionnaire was put together to explore the quality components of students learning and their performance of this CBL internship program. Qualitative analysis of interview data and Quantitative analysis was performed to link the approach of new graduates to VPP with their experiences of CBL program. Findings of the study illuminated student learning experiences during internship program associated to their transition to independent practice at entry level VPP. The positive results recommended the implications for the design and teaching of undergraduate internship programs.

Lam Terry, Ching Larry, (2007) had conducted the study, "**An exploratory study of an internship program: The case of Hong Kong students"**. This study investigated the satisfaction level and the expectations of hospitality students at Hong Kong university towards their internship program. The program participants were the hospitality management course students at School of Hotel and Tourism Management, The Hong Kong Polytechnic University. The data was collected in the form of survey questionnaire and was designed to find out the difference

between students' expectations and their perception about the internship program. 307 participants participated in the feedback questionnaires for this assigned program. The analysis of the questionnaire revealed that the students felt that the team spirit, involvement, guidance and help from supervisor had motivated them during working hours.

Beard Deborah F. (2007) investigated the study on **"Assessment of Internship Experiences and Accounting Core Competencies.''** This article investigated the assessment tools integrated into internship program of accounting major students at Southeast Missouri State University, USA. The assessment tools were used to collect data for maintaining daily reports of onsite internship experience, send bi-weekly emails to on campus coordinator, self-assessment survey, Internship written report and oral presentation. The tools were designed to measure the learning outcomes of students in terms of soft skills and professional competence. The performance was assessed by employed supervisors by filling the evaluation form for internship students. The assessment tools used by researcher were proved well for collecting data which cannot be collected by other means. The author recognizes the assessment tools used to evaluate the internship experience, student learning and satisfaction with the internship program had provided the important insights from the perspective of the student intern and external internship supervisor.

Abell, Sandra K. Dillon, Deborah R., Hopkins Carol J., McInerney William D., O'Brien, David G. (1995) had conducted a study on **"Somebody to count on": Mentor/intern relationships in a beginning teacher internship program.** This study investigated on the mentor and intern professional relationship for participants in beginning teacher internship program at Purdue University, U.S.A. The data was collected by conducting interviews with 29 mentors and interns. The interviews were based on analyzing the adaptability and interpreting of roles by interns and mentors respectively. The qualitative analysis of the collected data indicated that respect and trust between mentor and intern jointly construct the relationship. The flexibility in the mentor roles as per intern's needs encouraged the interns to adapt to their roles as well. Hence,

the study shows positive signs between mentor and intern relationships in internship program.

Bee croft, Pauline C., FAAN; Kunzman, Lucy MS; Krozek, Charles MN. (2001) had conducted the study as **RN Internship: Outcomes of a One-Year Pilot program.** The research study investigated the benefits of Internship program planned for Registered Nurse (RN) program curriculum. The participants for this study were fresh RN Graduates from hospital in LA, USA and were divided into two groups experimental group as fresh nursing graduates and control group as nurses with 2 years of RN experience. The main purpose of this study is to find out how to facilitate the transition of fresh graduates to professional registered nurses, prepare new graduates to be committed and confident on safe patient care. The findings revealed that the evaluation of one year PILOT Internship Program for experimental group participants was better on all measures than the control group participants. The analysis shows that internship program participants were more professionally trained, confident and great enhancement in their commitment to the organization as compared to control group participants.

2.2.1 Overview of studies related with internship program

The above reviewed studies have investigated the benefits of internship program at different levels and fields of professional education. Results of the studies revealed that participants of internship program got the opportunity to explore and experience the work environment which prepares them as professional and skilled individuals.

Bee croft, Pauline C., FAAN; Kunzman, Lucy MS; Krozek, Charles MN. Skledar Susan J., Martinelli Barbara, Wasicek Kelley, Mark Scott, Weber Robert J. (2009) The findings of the studies revealed the participants of the internship program had improved personal skills, contributed in creating interest and enhancing their commitment to the work organizations. Interns applauded on the incorporation and implementation of internship and recognized the professional opportunities and the retention rates had been increased with their institutes and work organizations. Matthew, S.M., Taylor, R.M. and Ellis, R.A. (2012) Lam Terry, Ching Larry, (2007). Abell, Sandra K. Dillon, Deborah R.,

Hopkins Carol J., McInerney William D., O'Brien, David G. (1995) Findings of the study shed the light on the positive responses and results for the implementation of internship program. The above three studies investigated on the improvement in professional connections with mentors, senior professionals or with clients in hospitality work environment. The intern's soft skills, communication skills, decision making abilities, problem solving and understanding the work environment that had been enhanced.

Beard Deborah F. (2007) study findings revealed that the incorporated data collection tools such as daily reports, biweekly updates, send assessment survey forms, reports and presentations had worked well to collect, assess, evaluate the outcomes of the internship program. The results of this study provided an insight to the other researchers to use the similar tools for the similar internship programs. Vahidi R. GH., Daneshkhah N., Araks M., Koushavar Hossein, Mohammadpourasl A. (2003) study findings expressed that incorporated internship program failed to provide benefits as expected because of non-authoritative, mismanagement and inappropriate implementation of program. Studies result revealed that students identified the lack of connect between interns and supervisors and resulted in non-satisfactory results of this program. Hence, the appropriate implementation and periodical evaluation of internship program is necessary for the desired learning outcomes.

2.3 Implication of the review of related literature for present study

The PBL and internship related reviewed studies were conducted for different subjects, (mathematics, engineering, science) and at different education levels (middle school, high school and higher education at Diploma, Bachelors, and master's level and in Pre-service teachers) using experimental, descriptive, and other statistical methods for data analysis. The results were positive and inclined towards benefits of using PBL methodology in teaching practice. Most of the reviewed studies emphasized on incorporating PBL approach in the curriculum of courses at school and college level. The internship program incorporated at undergraduate and diploma level for engineering,

medical and hospitality schools showed tremendous improvement in developing soft skills and performance competence in the study participants.

Pee, S.H. and Leong, Helene (2005) Gulbahar, Yesmin and Tinmaz, Hasan (2006) found PBL pedagogy as a vision for new education model for the 21st century and PBL was demonstrated as a student learning-centered model respectively. Both studies encouraged for, experimentation and exploration of new methodologies in teaching and learning concepts by applying project-based learning methodology. The above PBL conducted studies had showed the development of PBL based curriculum had proven beneficial in the student learning. Thus, PBL based developed curriculum with internship approach proved effective during implementation of program.

Beard F. Deborah (2007) designed assessment tools as integrated into internship program and measured the learning outcomes of students in terms of soft skills and technical competence field knowledge. Researcher recognized that the assessment of tools of data collection (daily reports, bi-weekly reports, Internship Project report, Presentation, and Internship supervisor evaluation form) provided important insights and had recommended on implicated these tools for future studies of internship evaluations. The above study revealed the tools of data collection had proved significant on collecting data. Thus, the researcher had developed the similar tools for this present study that may prove significant to collect the data for analyzing and measuring the effectiveness of the study's implementation.

Lee, Peiyu (2010) revealed the Project based learning research course provided students an opportunity to develop communication skills, critical thinking, problem solving in addition to improving technical competence or field knowledge as compared to the traditional education environment. David, Betzer Nadav (2007), Gökhan BAŞ, Ömer Beyhan (2010) identified that PBL pedagogy learning experience involved learners and allowing them to acquire in-depth knowledge and high learning achievements. PBL instruction and learning process proved effective for learners with average communication skills, and it developed the skills for group or teamwork, and problem-solving, decision making and communication skills. Gavin, Kenneth (2011-2012), Rodríguez González, C.A., Fernández Batanero, J.M. (2015), Musthak Ahmed

Syed, G. Madhuri, Reddy M. Sampath, Condoor Sridhar S. (2018) adopted PBL pedagogy in engineering courses. The results of the studies demonstrated student satisfaction with the PBL process and recognized that key skills required by industry such as group work, time management and development of technical competence or field knowledge were enhanced. PBL pedagogy in adopted engineering courses had been proven effective improvement in gaining filed knowledge along with developing skills like problem solving, communication skills, critical thinking, and teamwork in learners. Shi-Jer Lou, Yung-Chieh Chou, Ru-Chu Shih, Chih-Chao Chung (2016) Kartika Arum Sari, Zuhdan Kun Prasetyo and Widodo Setiyo Wibowo (2017) analyzed that PBL involved the students in the repeated PBL processes of preparation, implementation, presentation, evaluation, and correction which greatly improved the students' ability in collaboration, design, problem-solving and critical thinking along with improved communication skills.

The above studies had proved the significance of incorporating PBL pedagogy during the implementation of studies which had resulted in improving technical competence or field knowledge and soft skills such as communication, problem solving, teamwork, time management, critical thinking, decision making had been develop and improved. Thus, the researcher designed PBL based curriculum with internship approach for the present study which may prove significant and measure the similar benefits in improving technical competence or field knowledge and developing similar soft skills of the study.

Mergendoller John R., Maxwell, Nan L., Bellisimo, Yolanda (2006), Mioduser. Vahidi R. Gh., Daneshkhah N., Araks M., Koushavar Hossein, Mohammadpourasl A. (2003) Henry Holly R., Tawfik Andrew A., Jonassen David H., Winholtz Robert A., Khanna Sanjeev (2012) reported on dissatisfactory results of implemented Internship and PBL Program. Though the students' perspective of PBL and Internship program was not negative, but the internship program lacked in providing expected benefits as the result of inappropriate management and implementation.

Beddoes Kacey D., Jesiek Brent K., Borrego Maura (2010) English Mary C., Kitsantas Anastasia (2013) developed theoretical model by conducing meta-analysis of large collection of literature review recommended that learners must

take responsibility for their own learning process along with systematic development, practice, and implementation of PBL in engineering education.

Thus, the above studies revealed, results that the benefits of PBL program were not attained as of poor management and implementation of the program. The literature review of few studies emphasized and suggested on proper implementation of PBL program and learners' self-responsibility on their own learning process.

Thus, the researcher focused on developing an implementation plan which may provide the expected benefits of the PBL to the participants of this study.

The above reviewed studies proved the benefits of PBL pedagogy and recommended on incorporating PBL in the instruction, curriculum for preparing the learners with knowledge and skills to sustain and flourish in their future professions. The findings of the study guided the researcher to develop, incorporate and implement a PBL based Internship Program.

2.4 Summary of reviewed related literature

As per above reviewed literature, the results express that PBL, and internship programs benefits in similar way by enhancing much needed skills in present global growth and advancement. Teamwork, critical thinking, problem solving, time management and decision making, communication skills. are the tools to contribute and perform better in real-world scenarios. Related literature review recommended on the proper implementation of internship program rather than just offering the course curriculum. A study by Beard F. Deborah (2007) reported that the desired benefits were achieved by incorporating the required assessment tools for the structured implementation and evaluation of internship programs and recommended on implications of these assessment tools for future studies of internship program evaluations. The results of different studies revealed that the students improved technical competence or field knowledge and developed problem solving, communication, decision making and teamwork skills after participating in the PBL program.

One study reported that the implementation of internship program was quite successful in training the interns as internship participants were more

professionally trained, confident and which resulted in the increase in the rates of retention of the interns along with their great enhancement in commitment to the organization as compared to non-internship group participants. The studies by David, Betzer Nadav (2007), Gökhan BAŞ, Ömer Beyhan (2010) and Gavin, Kenneth (2011-2012), Rodríguez González, C.A., Fernández Batanero, J.M. (2015), Musthak Ahmed Syed, G. Madhuri, Reddy M. Sampath, Condoor Sridhar S. (2018) reported the PBL and internship program experience for students was positive as an implementation, but programs did not go well as of improper reinforcement of resources and shortcomings in planning and implementation of the program. Hence, it becomes very important to plan, incorporate, implement, and periodically monitor the PBL and internship programs to obtain desired learning outcomes. The teaching materials prepared with PBL method increase the performance along with significantly enhancing staff-student interactions.

However, as far as the researcher has reviewed the literature, no research has been reported to find the effectiveness of PBL approach with Internship Program for third year Civil engineering undergraduate students. Hence the researcher attempted to employ PBL approach in Civil engineering curriculum for the bachelor's in Civil engineering program in the form of internship program.