CHAPTER 2
REVIEW OF RELATED LITERATURE

2.1 Introduction

Critical Thinking is a conscious rational thought to issues, problems, questions and decisions to be taken. To add to this idea, it also considers careful consideration of assumptions, inferences, implications, questions, information and point of view. It deals with the concepts of intellectual discipline of mind wherein traits of mind are also part of the structure of Critical Thinking.

As used by Richard Paul (1992), It is defined here as, "Assessing and Analyzing thinking with a view to improve it". To further elaborate on the meaning, assessing of thinking is process that can be done by using framework of standards of thinking; analysis of thinking occurs with the help of organization of elements of reasoning; improving means improving thought process with the tool of intellectual traits of mind. The meaning and definition of Critical Thinking has changed fairly over the past decade. Originally the Critical Thinking domain was heavily contributed by cognitive psychologists. Thereafter philosophers also began to contribute towards the domain (Huitt, 1998).

The classified categories are presented below:

1) Difference Ideas on Critical Thinking
    - Philosophers Idea of Critical Thinking
    - Cognitive Psychologists Idea of Critical Thinking
2) Significant studies that have made mark in the area of Critical Thinking
3) Studies on Methodology of Critical Thinking
    - Studies conducted on Critical Thinking in high school using experimental method
4) Studies on Sample of the of Critical Thinking intervention program
    - Studies conducted on Critical Thinking for graduate students
    - Studies conducted on teachers
5) Other studies

2.2 Different Ideas of Critical Thinking

Critical Thinking has been regarded differently by different thinkers, theorists, authors, philosophers and cognitive psychologists. Since it has been viewed differently it has also been defined in various ways. Originally, Critical Thinking was an area that was focused by cognitive psychologists. The consensus of Critical Thinking lies in the fact that it is a cognitive skill and reasoning is part of it. Review of related literature found various researchers and experts that have worked with different aspects of Critical Thinking. Since the researchers and experts are working on various aspects and have emphasized on them based on their expertise and strong notion of the same there is no common definition of Critical Thinking. Since there is no common definition, there is no single way by which it can be imparted. It's difficult to reach at an inference as to the model that can be used for enhancing Critical Thinking. One of the major stumbling blocks to consensus has rested in the grounding of various theories and models in two distinct disciplines relevant to this study: philosophy and psychology. Philosophers have emphasized on the 'willingness' aspect of Critical Thinking, by using words like self-conscious thinkers. Psychologists, emphasized on cognitive processes in Critical Thinking that calls for certain standards for thinking critically (Reed, 1997).

2.2.1 Philosopher's Idea of Critical Thinking

Socrates made a mark in philosophy in the fifth century. He contributed majorly into ethics and became the founder of western philosophy. He dedicated himself into careful reasoning and sought genuine knowledge of truth by way of questioning. He became the first exponent of critical philosophy. The philosophy based theories do divulge common concerns.

Ennis (1987) emphasized upon reasonable reflective thinking focused on deciding upon what to do. Mcpeck (1988) as cited in Paul (1999) gave definition that revealed Critical Thinking as "the tendency and ability to involve in an action with reflective skepticism and thoughtful behaviour". Siegel (1988) as cited in Paul (1999) defines it as "thinking moved by reasons". Thus, Ennis (1987) and Mcpeck (1988) focused on reflection and thinking as an important dimension of Critical Thinking.

Theories in Critical Thinking differ in the terms of major points put up but they also have common trepidations (Ennis, 1987; Lipman, 1988; McPeck, 1981; Paul, 1993; Siegel, 1988 as cited in Reed, 1997 p.17). Johnson (1996) notes their resemblances with the following concepts: sensitivity, self-reflective, attitude, one's own biases, a reflective skeptical or questioning attitude (Reed, 1997, p. 17). This structure of Critical Thinking provides an emphasis on affective dimension to use Critical Thinking skills.

Richard Paul (1993), a philosopher whose work has been widely cited by scholars using both philosophical and cognitive approaches to Critical Thinking. Paul discusses upon the concept of weak sense and strong sense of Critical Thinking.

He accentuated upon grout out inadequacies in one's own thinking by pointing at a selfish critical thinker as Sophist. His concept of intellectual virtues has emerged as significant and distinguished aspect of the model of Critical Thinking. He discusses upon the disposition aspect of Critical Thinking. It served to establish a line of demarcation between attempts to use thinking skills to defend vested interests. He along with the broad range of the skills has developed a comprehensive model to incorporate Critical Thinking into any domains of life. This model is being used in this research because of its comprehensive background and an intervention is being developed based on the aspects provided by Richard Paul.

Thus, this discussion infers the fact that Critical Thinking according to philosophers should focus on reflection, affective propensities to exercise cognitive skills and also mentions the aspect of strong and weak sense of Critical Thinking along with Intellectual Traits of mind. These traits point to affective propensities required to implement the skills.

2.2.2 Cognitive Psychologists Idea of Critical Thinking / Cognitive Psychology Based Theories

In contrast the psychologists have worked broadly from ideas that come from cognitive psychology, theories of intelligence and developmental psychology. (Bransford, Sherwood, & Sturdevant, 1987; Halpern, 1996; Sternberg, 1987 as cited in Sternberg, 2006).

Some of definitions by Halpern (1996), Warnick and Inch, Hickey (1990) are:

Halpern, (1996) defines it as “the use of those intellectual skills that increase the probability of rational consequence”. Another definition by Warnick and Inch (2010), defines Critical Thinking as, “Capacity of a person to inquire into an issue, collect and assimilate all the data with reference to issue in question, reach at a definition by using the information collected and then defend the positions that are arrived at”. Hickey (1990), defined it as “involving analytical thinking for the purpose of evaluating what is read”. Here, it is seen that it doesn’t explain what kind of traits would be required in the process so that it is done in an unbiased way. It also places importance on intellectual skills, probability of rational consequence, mental processes, problem solving, collecting and assimilating data, analyze ideas, defend thoughts, reaching definition. Most of the concepts and ideas cited above focusses on usage of Cognitive skills (Reed, 1997) and also attempts to point at process of reaching to think critically. However, it does not answer many such questions mentioned below:

- How to achieve rational consequence?
- How to develop perseverance to collect all the data required to reach conclusions?
- How to empathetically look at the information?
- How to objectively collect data without any bias?

Further, cognitive and developmental psychology has been constructed on empirical research, while philosophy has relied on rational reasoning to reach conclusions. It is best that both the disciplines can contribute to making of a comprehensive theory and model of Critical Thinking to come out with major pointers (Kuhn, 1992; Kurfiss, 1988; Marzano et al., 1988; Quellmalz, 1987; Weinstein, 1995 as cited in Alemu, 2016).

2.3 Significant Studies that have made mark in Critical Thinking

Paul, Bartell, Elder (1995) conducted project that involved study on 38 Public Universities and 28 Private Universities to Determine Faculty Emphasis on Critical Thinking In Instruction. The objectives of the study were to measure present training

practices and acquaintance of Critical Thinking among faculty teaching in teacher preparation programs in California, to identify exemplary teaching practices that enhance Critical Thinking and to develop policy recommendations based on the results of the study. In-depth interviews were conducted for the purpose of data collection of the study. This study presented significant findings that though majority (89%) of them claimed that the main purpose of the classroom instruction is Critical Thinking but only a few (19%) could clearly explain what it actually means. Further, only (77%) could elaborate on the integration of Critical Thinking and only (9%) were teaching it on a typical class day. Further, assessment of Critical Thinking was known to few i.e only 9% could know it. Moreover, only 20% followed the explicit approach to Critical Thinking in their department.

Facione, (1990) conducted research on Critical Thinking so that expert consensus can be developed for purposes of educational assessment and instruction. This research adopted qualitative research methodology. This method is known as Delphi method of research technique in which experts together had a consensus for the questions on Critical Thinking. In all forty-six persons, having special experience and expertise in Critical Thinking instruction were asked to participate in the Delphi research. This consisted of significant findings; they are; Critical thinking dimension should include cognitive skill dimension as well as disposition dimension. It recommended that Critical Thinking if to be included in the educational system should be guided by holistic conceptualization of Critical Thinking. Some specific techniques and solid education is required to the honing of these skills. Critical Thinking belongs to a family of closely associated skills like problem solving, creative and higher order thinking. This skill can help with wide range of areas as education, personal and academics. This study recommends explicit instruction of this skill to be taken as a part of the course.

2.4 Studies Conducted On Critical Thinking In High School Using Experimental Method

Dheeran, A. (2016) conducted a study on ‘Impact of educational ergonomics programme on Critical Thinking amongst students of XI grade. The objective of the study was to check the impact of the intervention program on Critical Thinking as well as to study how academic stress and academic motivation, emotional intelligence

affects Critical Thinking level. The sample involved XI grade students of Gurudaspur School. The sample number was seventy out of which thirty five formed part of experimental group and other thirty five formed part of control group. The sampling technique used was snowball sampling technique. The results of the study revealed that the Critical Thinking enhanced because of the intervention program. It was also found that academic stress does not affect Critical Thinking. It was also observed that academic motivation significantly and positively affects the Critical Thinking.

Inference: Critical Thinking is not affected by academic stress but academic motivation affects CT positively.

Seeja, K (2012) conducted a study of "Influence of active learning strategies on Critical Thinking, thinking styles and achievement in physics among secondary school students". The objectives of the study were to find out whether active learning strategies influences Critical Thinking, thinking styles and academic achievement of physics subject. Also reactions of students towards Active Learning Strategies was aimed. The study adopted quasi experimental pre-test post-test two group design. A non-equivalent control group design was used. The pre-test and post-test were administered to the two non-equivalent samples in the form of intact groups of class IX of two different schools. Purposive sampling was used as the sampling technique as it might upset the class schedules. Various tools like Achievement test in physics, thinking inventory, critical thinking disposition scale, students reaction scale were used. With reference to this study the most related finding was that the Active Learning Strategies were effective in enhancing all the dimensions of Critical Thinking Skills that is Interpretation, Inference, Analysis, Evaluation, Explanation and Self-regulation among the secondary school students.

Inference: An active learning strategy enhances the analysis and evaluation skill as well as self-regulation amongst the students.

Prasad, (2015) did his research on "Influence of metacognition and Critical Thinking on academic achievement of higher secondary students". The objectives of the study were to study the level of Critical Thinking, metacognition and academic achievement of the students. Further it was also studied whether metacognition and Critical Thinking affects the academic achievements of the students or not. Using

Random sampling technique for XI grade students of Math-Biology and sciences group, 1005 students were selected as sample of the study. These students were selected from schools of Tamilnadu district. The study found that Critical Thinking affects academic achievement of the students. The study further inferred that metacognition has positive correlation with academic achievements. Regulation of cognition is very important and helps in academic achievement. The researcher has suggested thinking aloud, regulation of cognition and self-reflection to be important competencies to be developed by the students.

Inference: Critical Thinking affects academic achievement. It also suggests thinking aloud, regulation of cognition and self-reflection as important aspects of Critical Thinking. Metacognition has positive effect on the academic achievement.

Ratheesh (2014) studied the "Effectiveness of critical pedagogic approach for media education at higher secondary level in Kerala district". The sample of the study consisted of fifty seven students of experimental group as well as control group of higher secondary school of Kerala. The design of the study is non-equivalent control group design with purposive sampling technique. It was found that critical pedagogic approach improves the Critical Thinking, media-vistic approach as well as it improves value preference of the students. The group was given reflective activates for improving Critical Thinking. From the qualitative data it was revealed that stress of reflection process helped them to arrange their learning with more conceptual clarity. This research suggested the need to train the teachers in critical pedagogic approach. This also highlights the importance of shifting from teacher centered classroom to learner centered classroom. This study also suggested pre-service education program to have such course that will involve the shift from teacher centered class to learner centered class.

Inference: There is a need to train the teachers in critical pedagogy. Emphasis is on reflection for clarity. Critical Thinking can be improved and it improves mediavistic approach as well as value preferences

Tawai (2012) conducted a study titled, "Development and try out of instruction package for enhancing of thinking skills of primary school students". The objectives of the study were to develop and try out the instruction package for

enhancing of thinking skills of primary school students and to study the learning achievement on thinking skills of primary school students taught by instruction package for enhancing of thinking skills. Even the opinions of the students with respect to the instruction package were studied. The design chosen was an experimental research with single group design. The sample consisted of thirty students. It was found that the instruction package was effective in enhancing the achievement on thinking skills.

Sherafat (2015) conducted study on "Effect of Critical Thinking study habits and self-esteem on academic achievement among secondary and senior secondary school students". The purpose with which the study was conducted was to find out whether Critical Thinking, self-esteem and study habits affect academic achievement or not. The tools used for the present study were Mysore Critical Thinking scale, test of study habits, self-esteem inventory. The sample of the study consisted of secondary school students of Mysore city. The study revealed that Critical Thinking affects academic achievement of the students. On the contrary the study habits and self-esteem doesn't happen to influence academic achievement. The study further suggested that if Critical Thinking is so important then the attention must be directed to the teachers for equipping the teachers with this significant variable for enhancing the scores of the students.

Inference: CT affects achievement and study habits and self-esteem are not the variables that influence academic achievement. Emphasis must on teachers to train for Critical Thinking.

Krishnan (2011) studied "Effect of blended learning strategy on higher order thinking and learning science among secondary school students". The purpose was to find the effectiveness of blended learning strategy on Critical Thinking, problem solving and science achievement scores. It was found that this strategy which incorporated the involvement of students by asking them to reflect critically, analyze and interpret phenomena was effective in enhancing Critical Thinking along with problem solving and the achievement scores in science. The study opted for quasi-experimental design and involved purpose sampling technique that was used.

Inference: the strategy of asking questions and reflecting critically on tasks are part of blended learning strategy which proved to be successful in enhancing CT

Manjula (2013) researched on 'Effectiveness of interactive multimedia strategies on achievement in Mathematics and Critical Thinking ability of standard IX students". One of the objectives that were relevant for this study was to find the relationship between Critical Thinking ability and achievement in mathematics. The major finding relevant for the study was difference in the levels of intelligence influences the Critical Thinking ability and also there is a positive correlation between achievement in mathematics and Critical Thinking ability of the students.

Inference: intelligence and mathematics educations affects CT.

Kaur (2009) did a study on, "Effectiveness of outdoor environmental education program for enhancing Critical Thinking, social skills and the responsible environmental behavior among fifth grade students". The study was conducted with the above purpose on fifth grade students of two schools that involved one hundred twenty students as a sample for the research. The sample was purposive in nature and it was found that students who were taught with the outdoor environmental education program improved on their Critical Thinking skills than the control group students that received instruction through traditional teaching. It was also found that students with high intelligence had higher scores on Critical Thinking test. It was also derived that along with increase in Critical Thinking skills, the social skills of the students also improved. One major finding was that increase in environmental behavior was product of increase in Critical Thinking skills

Inference: CT can improve environmentally friendly behaviour and also enhance the social skills of the students. High intelligence has high score in Critical Thinking achievement.

Sharma (2011) researched on, 'A study of socio-psychological correlates of learning-thinking style and creativity of secondary school students". The objective was to find whether there exists a relationship between socio-economic status and learning and thinking styles of secondary school students. Also, the objective was to whether personality affects the learning and thinking style of these students. It was

also aimed to find whether personality affects the creativity of the students. The sample involved six hundred students of secondary school in Haryana. It was found that there is a positive relationship between socioeconomic status and learning and thinking style of the secondary school students. There is also a positive co-relation between personality and thinking and learning style. It was also revealed that there is no correlation between personality and creativity of the secondary school students.

Inference: personality influences the thinking and learning style.

Meghani (1999) research titled, "A study of effectiveness of a teaching-learning strategy to developing Critical Thinking in students of std. XI using psychology as content" proved that the intervention program was successful in developing Critical Thinking in students. The study was carried out for four months for twelve students of arts stream of a school in Vadodara. The design of the study is single group pre-posttest design. The study revealed that the evolved strategy was effective in developing Critical Thinking of the students. It was also found that the students were able to think independently, were able to evaluate arguments, beliefs and opinions. They could think dialectically and were also able to apply knowledge in new situations. They could demonstrate reflective thinking and also imbibed affective dimensions of thought like intellectual autonomy, intellectual empathy, intellectual courage and intellectual humility. Some also could develop the questioning skill.

They could also demonstrate the ability of critical reading.

Inference: CT involves affective dimension

Patel (2011) researched on "Development of a Critical Thinking program and its effectiveness for students of class IX". The objective of the study was to standardize Critical Thinking test and to study the effectiveness of Critical Thinking program on Critical Thinking abilities, effectiveness with reference to gender, socio-economic status and intelligence test. It used the One-Group Pretest-Posttest Design. The findings of the study were that the mean score of students in post-test is higher than that of pre-test which shows the effectiveness of Critical Thinking program.

Inference: Intervention can improve CT

Tyagi (2017) did his research on, “Impact of Critical Thinking on mental health adjustment and emotional maturity of college students”. The present study was Descriptive in nature and the objective was to study the impact of Critical Thinking on the Mental Health, Adjustment and Emotional Maturity of College Students. The sample was of four hundred students from M.D University, Rohtak. Tools like Critical Thinking Ability Test by, Mental Health Battery and Adjustment Inventory for College Students. Also, Emotional Maturity Scale was used in the study. The major findings of the study were Professional college students were found to have more Critical thinking than their counterpart. It was found that if students are equipped with adequate thinking skills then students are able to regulate emotions like anger, stress, fear, shame, sadness and guilt. High Critical Thinking skills have positive impact on student’s mental health than with low Critical Thinking skills. The present study identified that mental health is product of one important component of Critical Thinking. Further, Critical Thinking affects mental health positively. It also reduces several symptoms of anxiety and depression. Students with the help of metacognition were able to identify strengths and weaknesses of their own thought processes.

Inference: High CT means better mental health. CT reduces symptoms of anxiety and depression. Metacognition helps

Vijayalakshmi, D. (2016) did his research on “Using Task Based Teaching to Develop Critical Thinking among Secondary Level ESL Learners”. The main aim of this semi-structured interview was to find out in the first place if the teachers and students were familiar with the concepts called’ task-based teaching’ and ‘Critical Thinking’. The study aimed at providing the teachers with an alternative method of teaching other than the traditional methods of teaching. This study found that teachers of Telangana government schools resorted to traditional methods of teaching and these traditional methods of teaching do not enhance Critical Thinking abilities in the students. Furthermore, it was found that task based teaching that incorporates problem solving and problem posing improved Critical Thinking abilities. Also these abilities helped enhancing language skill of the learners.

Inference: CT helped enhancing language skills and traditional method of teaching doesn’t not improve CT

Kumari (2014) did research on “The title of the research was the effectiveness of Six Thinking Hats Strategy on parallel thinking, lateral thinking, general creativity and argumentativeness of students”. The objectives of the research were to study the effectiveness of six thinking hats on parallel thinking, lateral thinking, general creativity and argumentativeness of students. The measuring tools included the Parallel Thinking Test, the Lateral Thinking Test and more. Only one school was selected from the urban area of Nangloi District. Total of one hundred sixty students were selected as sample for the study. The results depicted that the six thinking hats strategy was more effective in improving lateral thinking scores of the high intelligent students in comparison to middle or low intelligent students. Also, the Six Thinking Hats strategy was very much effective in development of general creativity of high school students. The Six Thinking Hats strategy was helpful in enhancing creative ability of high school students. The argumentation level was higher in experimental group than Control group

Inference: six thinking hats for enhancing CT and creativity. High intelligence could improve on lateral thinking in a better way.

Gurubasappa (2010) researched on “Critical Thinking, Emotional Intelligence, Creativity and their effect on Academic Achievement in Science of Secondary School students." The aim behind this study was to find the effect of Critical Thinking, emotional intelligence and creativity on the academic achievement of secondary school students. The sample consisted of IX standard secondary school students studying in English medium of Tumkur district. Stratified random sampling was used to select three hundred ninety eight students of the school. The tools like Emotional Intelligence Inventory, test of physics, SESS test etc. helped to find that Critical Thinking, emotional intelligence and creativity has positive correlation with the academic achievement of the students. The study suggested that teachers and students must be explicitly trained for strategies that can help improve Critical Thinking.

Inference: CT has a positive effect on achievement

Purohit (2016) conducted a study on “Study of coping skills for 21st century at secondary school level”. The objectives of the study were Identification of expected Coping Skills for 21stCentury, Designing Educational Activities & Tools and

Technique to Study Coping Skills for21stCentury. Shannen school of vadodara was selected purposively for the study. The twenty-two students of standard IX and teachers were the participants. The tools that were used for the data collection are focused group discussion, situation test, semi-structured interview, brainstorming session, reasoning test, picture perception test, observation, field notes, interview schedule, moodle and profile of the students. The findings of the study were that the expected Coping Skills for 21stCenturywasto cope with the challenge of to be appreciated, accepted &recognized: to meet this challenge they require reflective skills, Critical Thinking skills, social responsibility skills and communication &collaboration skills. The second expected coping skill was energy of students is not being channelized and student unrest: to meet this challenge skill of adjustment, Critical Thinking skills and social relationship skills are required. Majority of the students were found lacking in reasoning skills, planning leisure time, creative thinking, Critical Thinking, system thinking skills, reflective skills, research skills, learning skills and skills of synergy. Only Two students were found to have both, creative thinking skills and Critical Thinking skills.

Inference: only two students have Critical Thinking skills plus the expected coping skill is to be appreciated, accepted and to be recognized. Majority of the students were found to be lacking in reasoning skills

Wakaluya (2014) conducted a study with a purpose “to examine the relationship between Critical Thinking skills and academic performance, and to determine the degree to which demographic characteristics moderate the relationship”. The sample for the study was two hundred ninety seven VIII grade students of American International School of Shanghai, China. The California Critical Thinking Skills Test Middle School Series was administered to assess Critical Thinking skill levels of students. Results showed that grades and MAP test scores were significant predictor variables for Critical Thinking skills, indicating a strong relationship between Critical Thinking skills and academic achievement. Results indicate that academic achievement is closely tied with Critical Thinking and that some variation exists across cultures.

Inference: Critical Thinking is closely associated with academic achievement

2.5 Studies Conducted On Critical Thinking For Graduate Students

Buranapatana, M. (2006) researched on "Enhancing Critical Thinking of Undergraduate Thai Students through Dialogic Inquiry". The objectives of the study were to investigate the concept of Critical Thinking in general literacy and to find an alternative model which can be effectively used in enhancing Critical Thinking.

Research plan and methods were to create a new model which can be used effectively in the teaching of Critical Thinking in a Thai context. Data analysis was done by analyzing changes in the student's writing which were congruent with the concept of Critical Thinking adopted in the study. Findings of the research were, Classroom discussions showed that in the last month of the course the quantity of students' questions increased dramatically. 80% of students expressed that they liked their classes and enjoy their classroom discussions.

Inference: CT classes encourage questioning and majority of the students enjoy the classroom discussions of CT classes.

Everett (1999) conducted study with a purpose to see the level of "Critical Thinking instruction in the Greater Los Angeles Area High Schools". Also an explicit purpose was to see whether high school teachers can articulate elements of Critical Thinking. Also, the purpose was to determine whether the teachers know how to integrate it in instruction or not. The research was a qualitative research. This research adopted tools like observations; it also included narrative analysis as well as interviews. The major findings reported were, a large percentage of teachers do not articulate a clear meaning of Critical Thinking instruction. The teacher education program did not prepare them for the meaning of Critical Thinking. They have little vocabulary to talk about standards of Critical Thinking, how can it be transacted accurately, how they would reconcile covering content fostering Critical Thinking, or what specific Critical Thinking skills they would like their students to develop.Also majority of the teachers who demonstrated exemplary practice in Critical Thinking did not learn how to do it in their teacher preparation programs. This study strongly recommended that Critical Thinking must be an important core for school reform.

Inference: teacher education program does not incorporate practices of Critical Thinking

Reed (1998) conducted study that was Titled “Effect of a model for Critical Thinking on student achievement in primary source document analysis and interpretation, Argumentative reasoning, Critical Thinking dispositions, and history content in a community college history course”. Some of research questions that the study had were to check whether explicit training in Paul’s Model will help the students to perform better on the test, will they perform better in evaluation of arguments and will the community college students differ in their attitudes and dispositions? The tools like Document Based Questions , the Ennis-Weir Critical Thinking Essay Test, the California Critical Thinking Dispositions Inventory, achievement test in history based on college board came with the findings that students who completed the course had slightly higher mean scores on the pre-tests than students who did not complete the course, Older students scored higher than younger students on both pre-tests and post-tests, with the exception of higher scores for younger students on the History Content Exam, Mean scores of male were higher than for female on both pre-tests and post-tests.

2.6 Studies Conducted On Teachers

Patel (2011) studied on, “Development of an instructional strategy for primary school teachers to teach creative and Critical Thinking skills” with an objective to carefully select tools that would enhance creative and Critical Thinking skills of the teachers. Also, to enable the teachers to use the tools in developing the lesson plans. The study conducted an experimental research and incorporated the single group pre-test post-test design. The sample consisted of twenty-five randomly selected teachers of Visnagartaluka teachers. This study came out with the findings that the sampled teachers improved on awareness aspect of creative and Critical Thinking. Also, the teachers improved on the fluency component of Critical Thinking. The teachers also showed improvement in flexibility and originality component of creative thinking. The teachers improved on Critical Thinking skills as well. The teachers were able to redesign the lesson plans incorporating the creative and Critical Thinking component of the research. This research strongly suggest that the curriculum of elementary teacher education program must have creative and Critical Thinking components as

part of the curriculum as well as lesson plans that can be modified using these two important skills.

Inference: teachers are able to redesign the lesson plan with CT incorporation.

Arockiasamy (2014) studied on “Emotional intelligence, Critical Thinking and stress management of High school teachers”. The investigator has used survey method to study ‘emotional intelligence, Critical Thinking and stress management of high school teachers. The area of the study consists of three southern revenue districts of Tamil Nadu. The sample consists of five hundred sixty high school teachers in Tirunelveli, Thoothukudi, and Kanyakumari districts. The data collected with reference to emotional intelligence, Critical Thinking and stress management found that 20.7% of high school teachers have high level of truth seeking, .23.2% of high school teachers has high level of open-mindedness, .23.2% of high school teachers has high level of analyticity, 21.6% of high school teachers has high level of systematicity, 20.7% of high school teachers has high level of self-confidence, 20.4% of high school teachers has high level of inquisitiveness

Moreyra (1991) researched on study on the “Role of thinking frames in developing teachers' Critical Thinking skills and dispositions”. The sample consisted of forty seven elementary teachers. These teachers also participated in a ten week program that was conducted by the researcher. The instruction that consisted of Richard Paul’s model was used in re-modelling the lesson plans. This also included thinking frame and also had a graphic representation of critical reflection. The comparison group received the same instruction with the exclusion of the thinking frame. The major findings of the study were as follows that the teachers who were taught in the experimental group did not obtain statistically different scores on the Ennis-Weir Critical Thinking Essay. Teachers across groups showed non-significant differences in how they perceived themselves as thinkers when measured by Edward's Self-Concept as a Thinker Scale. Teachers in the experimental group reached a higher level of reflectivity as assessed by Van Mannen's Levels of Reflectivity. The results of one-way analysis of variance at the.05 significance level revealed that there were no statistically significant differences. However, in the qualitative analysis of the data the results indicate that teachers in the experimental group reached a higher level of

critical reflection. They articulated better understanding of the mental constructs and processes that underlie teacher behaviour.

Inference: Through Paul's model they reach higher level of critical reflection, they understand mental processes in a better way.

2.7 Studies Conducted On Student Teachers

Sridevi (2016) researched the effectiveness of six thinking hats on the problem solving ability and lateral thinking of the B.Ed teacher trainees. This experimental study was conducted on a sample of thirty students of experimental group and thirty students of control group. The research design is pre-post-test experimental control group design. It was concluded that the technique was effective in developing the problem solving ability and lateral thinking of the B.Ed teacher trainees.

Inference: six thinking hats strategy was effective in developing Critical Thinking

Sumangala (2000) has conducted a research on "Critical Thinking skills of B.Ed students of Mangalore University". The researcher concluded that the level of acquisition of Critical Thinking Skills among the B.Ed students of Mangalore University was not equally distributed. The scores of female B.Ed students in Critical Thinking Skills were higher than those of male B.Ed students of Mangalore University. The study demonstrated that there was no difference between the graduate and post-graduate B.Ed students of Mangalore University in terms of Critical Thinking Skills. It was noted that the B.Ed students of science stream had higher score than the B.Ed students of the arts stream. There was a significant positive relationship between the Academic achievement scores and the scores on Critical Thinking Skills of B.Ed students of Mangalore University

Inference: female students had higher Critical Thinking skills than male bed students

2.8 Other Studies

Colley, Bilics, Lerch (2012) conducted study on, "Reflection: A Key Component to Thinking Critically". The main purpose of this study was to investigate students' Critical Thinking by critically examining their reflective writing assignments. The sample consisted of ten students. Marzano's New Taxonomy was used for analysis of the data in order to identify the level of students' thinking through their reflective writing. Through the reflective writing assignments in all four courses, changes were seen in the students' thinking throughout the semester. Through reflective writing assignments students were able to achieve self-system, metacognitive, and cognitive thinking.

Inference: Through the reflective writing assignments in all four courses, changes were seen in the students' thinking throughout the semester. Through reflective writing assignments students were able to achieve self-system, metacognitive, and cognitive thinking.

Choy (2012) conducted study on "Reflective Thinking and Teaching Practices: A Precursor for Incorporating Critical Thinking into the Classroom". This study involved sixty participants from institutions of higher learning volunteered to answer a questionnaire to determine the level at which they reflected on their teaching practices as an indicator of their level of Critical Thinking. It would suggest that Critical Thinking is practiced minimally among teachers. The results showed that teachers were on the whole not critically reflective as their responses did not show that they actively practiced the four learning processes. It would seem that teachers were using reflective thinking to enhance the quality of their teaching.

Research shows that metacognition is a key to successful learning. It is observed that learners with metacognitive abilities can regulate their learning processes and also their zones for proximal development develop (Vygotsky, 1978 as cited in Block, C.)According to Flavell (1979) and Martinez (2006) that Critical Thinking is subsumed under metacognition.

Kusumarn (2013) researched upon "Analytical thinking management practices of primary school administrators of Thailand". The research design was a

descriptive and survey was conducted to analyze the same. The findings revealed that the practices of the school administrators were at the moderate level. It was also found that age and work experience doesn't affect mean scores of analytical management practices. It was suggested in the research that reflective learning should be a policy initiative by the board governing it. This reflective learning will involve wait time before responding to questions and asking questions. Student's ability to reflect on their own learning was significant suggestion of the research. Again this research focussed on the need of creating learning environment that will involve metacognition and self-explanation strategies. Discussions should be promoted in the class and the school administrators must promotion of these skills amongst teachers. The school administrators should also understand the process of analytical thinking.

Inference: the administrators had moderate analytical skills.

Reza (2017) studied the 'Impact of Critical Thinking on speaking performance of English second language learner's analytical exam'. Quantitative research method was used in the study. This study implemented explicit instruction of Critical Thinking through debate and questioning methods. It was revealed from the study that language is not the only responsible factor for determining thought. There was a difference in scores on the exam but that explicitly can't be attributed to Critical Thinking.

Ramakrishna (2017) conducted a study on the role of ESL learner's Critical thinking ability in their performance on different IELTS reading items. The objectives were to study the same. The sample consisted of 100 university level students. It was found that there is a positive correlation between Critical Thinking ability and language learners reading performance on IELTS exam. This study strongly suggested that Critical Thinking is a skill which is important for performance in high stress tests including IELTS.

Inference: Critical Thinking affects language reading ability

Lad (2012) conducted study titled, "Construction and standardization of Critical Thinking test for secondary school students of Gujarat." The objectives for study were: To construct the Critical Thinking test for secondary school students of

Gujarat, to standarize the Critical Thinking test for secondary school students of Gujarat, to study the Critical Thinking of secondary school students in relation to Gender, in relation to Area, in relation to Grade, in relation to Age and to study the Critical Thinking of secondary school students in relation to Anxiety. The sample consisted of five thousand six hundred and seventy two students of VIII, IX and X standard students of Gujarat. These students were selected by stratified random sampling method. Survey method was used for the present study. The purpose of this study was construction and standardization of Critical Thinking test for the secondary school students. Results of the test were that total 58 items were selected in the Critical Thinking test.

2.9 Need For Critical Thinking

Need arises from the fact that very few teacher education programs provide for Critical Thinking.(Paul, Elder, Bartell, 2000; Everett, 1999; Arckiosamy 2014).The fact that emerges from the above study of the literature is basically the need for Critical Thinking in schools, universities and across the educational institutions. This can be based on various findings of the study that state Critical Thinking enhances academic achievement in the subject (Wakaluya, 2014., Gurubasappa,2010 Manjula, 2013.,Sherafat, 2011., & Prasad, 2015) is proved to take care of mental health, helps in managing fear; being sad, depression etc. Critical Thinking is basically helping the students to assess, analyze and improve their own thinking. It also is being studied by researchers that reflection and metacognition are two major constructs of Critical Thinking. Thus Critical Thinking is necessary as this students will be able to ask questions and also will be able to observe the problems that have been evident in their thinking processes. Teaching Critical Thinking in classes is again a challenge as how to take up Critical Thinking is to be known. Pedagogy to transact Critical Thinking in a coherent way is lacking (Balcaen, 2011).Critical Thinking is difficult to be transacted (Williamgham, 2007) and the strategies are not known and are limited (Gibson, 2007 as cited in Balcaen, 2011vc).

According to Balcaen, 2011, asking challenging questions, background knowledge, Criteria for judgment, CT vocabulary, thinking strategies, habits of mind and assessing for thinking can help enhance Critical Thinking. According to NCERT in its ‘Education for values in Schools’ document- A framework observes that

strategies that can be adopted to develop Critical Thinking can be Reflective practice, discussion, questioning, role plays, anecdotes, value clarification and group activities. Case study pedagogy (Mcdade 1995 as cited in Yang, 2005.), cooperative learning (Cooper 1995 as cited in Yang, 2005), Socratic Questioning (Paul, 1995; Yang, 2005) is effective technique to teach for Critical Thinking. Thus, this study uses reflective journal for the basic construct of Critical Thinking i.e. reflective journal and posting daily entries in the journal. Further, this study used Socratic questioning, role plays, articles, situations, real life examples and discussion for the purpose of transacting the content. The intervention program was designed based on these parameters

2.10 Implications For The Present Study

The observations that emerge from the above review of related literature are quite significant and relevant. The need for transacting Critical Thinking (CT) is evident from the above literature review. The need arises from the fact that CT is an important skill that helps enhance academic achievement of secondary (Prasad, 2015), senior secondary school students (Sherafat,2015; Krishnan, 2011; Wakaluya. 2014; Reed, 1998; Gurubasappa, 2010) as well as B.Ed students (Sumangala, 2000). It is also observed that CT is an important skill for high stress tests like IELTS (Ramkrishna, 2017). Further the reviews prove that CT has positive correlation on mental health. It reduces symptoms of anxiety and depression (Tyagi, 2017). It is found that it helps in improving social skills of students and increases environment friendly behavior. (Kaur, 2009). It is identified as one important coping skill of 21st Century (Purohit, 2016). It was also proved by many studies that there is a strong relationship between Critical Thinking and academic achievement (Wakulya, 2014). Tyagi (2017) proved from his research that students that have high Critical Thinking level are able to have better adjustment than their counterpart college students having low Critical Thinking. This highlights the need for transacting Critical Thinking skills for the present study.

Since it is an important skill that improves academic achievement and also helps in relieving stress and depression it has to be transacted in the schools. The teachers can become active agents in transacting and cultivating the same. But studies report that they are not explicit part of teacher education program (Everett, 1999). His

study also revealed that teachers did not learn to integrate Critical Thinking into instruction in their teacher training programs.

Study conducted by Paul et al. (1995) revealed that faculties are unable to give an elaborated articulation of concept of Critical Thinking. Among University faculty, only 9% clearly teach CT on a typical class day and only 19% clearly can give explanation of what CT is (Paul et al. 1995). Paul has also provided with one more noteworthy pointer in his research that teachers cannot clearly specify basic standards essential to Critical Thinking. Teachers are not able to name the theory that can be taken up for enhancing Critical Thinking. Everett, (1999) also proved that a large percentage of teachers do not articulate a clear understanding of Critical Thinking.

If we see the condition of high school teachers, it is proved that only 23.2% high school teachers teach analyticity skills (Arckiosamay, 2014). Even, the school administrators have moderate level of CT (Kusumarn, 2013). The above reviews reveal that Critical Thinking is not evidently practiced in teacher education program and is not explicit component of teacher education program. This intervention program thus is explicitly transacted through the student teachers so that the student teachers prove to be the agents for transacting the same.

Study conducted by Facione (1990) reaffirmed the findings that affective dimension is a necessary aspect for developing Critical Thinking. Facione provided a major finding through his study that disposition is required to develop Critical Thinking skills. It is proved from the reviews metacognition and self-reflection helps improve Critical Thinking (Tyagi, 2017; Prasad, 2015; Ratheesh, 2014). Majority of the philosophers like Mcpeck (1988); Ennis (1988); Lipman (1988); Seigel (1988) & Paul (1995) emphasize upon reflective thinking and questioning attitude as a common quality for being a critical thinker. Reviews also reveal that Paul's model of Critical

Thinking helps in reaching higher level of critical reflection as well in understanding mental processes in a better way (Moreryra, 1991).

It also inferred that teacher centered classroom will not improve Critical Thinking skills (Ratheesh, 2014). The transaction of CT explicitly through various methods and techniques of teaching is unknown.

But the reviews suggest that the idea of asking questions (Krishnan, 2011) also improved the chances of enhancing Critical Thinking and further increased classroom discussions. The students enjoyed such classroom discussions (Buranpatana, 2006).

Studies conducted by Seeja (2012); Tawai (2012) indicated that active learning strategies are effective in enhancing Critical Thinking and students enjoy classrooms that consists of discussions. The review of related research has also proved that students demonstrated their ability to think independently through logical reasoning and justification (Meghani, 1999).

Thus, asking questions, inclusion of dialogic inquiry, active learning, self-reflection, meta-cognition have proved to enhance Critical Thinking skills of the students. So, this study uses questions, dialogue as a source of discussion, Intellectual Journal writing as critical tools to reflect and think about their thinking process so that Critical Thinking skills can be enhanced.

The research done in the area of Critical Thinking by developing an interventional strategy or package has revealed that Critical Thinking skills can be developed through explicit teaching of the skills. Paul's model is found to be effective in enhancing Critical Thinking skills of community college students (Reed, 1998).

Thus, this study uses Paul's Model to Critical Thinking to transact the Critical

Thinking as it is considered to be comprehensive model incorporating philosophical as well as psychological dispositions (Reed, 1998).

The methodologies adopted by the above studies are qualitative as well as quantitative. The prominent methodologies that have been taken up are in the form of in-depth interviews (Paul, 1999), Delphi method (Facione, 1990), and descriptive research (Meghani, 1998). Some studies have adopted quantitative methodology in the form of designing instructional package to enhance the Critical Thinking skills (Patel et al). Quasi experimental research and purposive sampling were used in majority of the studies (Seejaet al 2012 & Krishnan, 2011.)The studies that have taken up the experimental design in the form of single group pre-test post-test design.

(Meghani et al 1999). An attempt to integrate both the research methodologies is not very popularly observed.

This study therefore aims to make an intervention program to transact Critical Thinking as it is proved that intervention program focusing on improving Critical Thinking helps enhancing the skill (Meghani, 1999; Patel, 2011; Seeja, 2012; Tawai,N. 2012; Krishnan, 2011; Vijay Lakshmi, 2016) and adopts a quasi-experimental design as it is widely used in the research. From the reviews it was found that mostly used model in Critical Thinking studies is the survey and another one is experimental. Some qualitative studies are carried out but studies in which qualitative and quantitative used is quite limited (Islek & Hursen, 2013). That is the reason that, this study uses mixed method research for the present study.

Majority of the studies are conducted on High School Students. Very few studies are done in the area of student teachers or teachers (Islek & Hursen, 2013). That is the reason that this study considers student teachers as the sample of the study.

Thus, the reviews of related literature conducted by researcher gives rise to the fact that very few studies are found to be done on developing Critical Thinking skills of the teachers. It also finds it necessary to educate the student teachers as hardly any studies have been conducted on student teachers till now. There is also a need to have a well-structured intervention program that would address the component of Paul's model to Critical Thinking explicitly.

2.11 Rationale for the Present Study

We are moving into the era of 21st century skills and with that earnestly wanting to develop the Critical Thinking skills as complemented and promulgated by the Commission, policies and authorities in India such as National Policy on Education, National Council of Educational Research and Training, National Knowledge Commission. Lipman (2003), Frerie (1996), Paul (1990), Giroux (2010) have coined this as an essential concept in education. An austere contrast is observed when education is promoting rote memory, factual knowledge, textbook culture (NCF, 2005 p.13) against building decision making and judgment capacities (Meghani, 1999).

The unprecedented importance of the component of Critical Thinking in education conveys that the curriculum must be integrating Critical Thinking as a component of school education system as it involves decision making and builds judgment capacities (Helsdingen, 2010). But education has not been able to completely integrate critical Thinking as there is no subject that explicitly focuses on Critical Thinking development and there is very little evidence that points to the fact that other subjects can develop Critical Thinking skills explicitly (National Research Council as cited in Willingham 2007; Jones & Haydon 2012; Massa, 2014).

Although, there are some discussions happening in few classes but that doesn't suffice the austerity with which critical thinking needs to be taken up. Further, the National Council of Teacher Education does propose critical thinking in one of the subjects but not as in continuous element that needs to be taken up across all the subjects. There is a strong need to reformulate epistemological perspectives of education as a whole by taking up Critical Thinking as a fundamental and critical part of the curriculum. As currently practiced, it does not need to be a part of the school curriculum but rather a method of learning which conscientiously needs to be implemented. This follows due to the fact that the teachers are unable to articulate the concept of critical thinking and cannot provide plausible examples of how to foster critical thinking in the classroom (Paul, Elder, Bartell 1995).

On the other hand, The European Commission Report 'Communication on Teacher Education' (2007) observes that teacher quality is significantly and positively correlated with pupil attainment and it is the most important within school aspect explaining students' performance. There is ample empirical research evidence to suggest that students' 'achievement is significantly related to the professional preparation of teachers. The quality of learning is enhanced if students are taught to think critically. Further, The Education Commission (1964-66) of India accepted this influence of teachers in powerful words, "No system can rise above the status of its teacher..." Similar sentiments have been expressed by the Delors report (1996), and UNESCO report on Teacher and Educational Quality: Monitoring Global Needs for 2015(2006). The teacher's role can be significantly improved if the teacher education program commensurate with the critical thinking component. Further, If we see the

condition of high school teachers, it is proved that only 23.2% high school teachers teach analyticity skills (Arckiosamay, 2014).

If such is the role of the student teachers, the teacher education program must provide with such teacher quality. Teacher Education has been aiming to strengthen its identity with evident improvement but, there is no end to perfection (Goel, 2012). Very few teacher education programs are transacting the idea of Critical Thinking (Paul et al., Everett, 1999, Arkiosamy, 2014). The role of the apex institution – National Council of Educational Research and Training, is appreciable though much more efforts are needed, indeed to make critical thinking a systematic and embedded part of its teaching learning process. Thus, researcher strongly feels that critical thinking is important dimension that needs to be incorporated into the student teachers' as they are basic unit of teacher training program that can take it a step further into the students making it happen across different schools and areas. The researcher has selected student teachers of Navrachana University as the experimental group because of the willingness of the University administration to make students available for the study and the duration of the intervention program. The critical thinking component was taken up in semester-I of the B.Ed program.

Further, Based on the literature review, Paul's model appeared to be the best choice for integrating a rich and practical concept of critical thinking into the course because of its solid foundation in theory coupled with both philosophical and psychological approaches to critical thinking (Reed, 1998). It has the further advantage of focusing on critical thinking traits that help students improve as (e.g., intellectual empathy, intellectual perseverance, and fair-mindedness) as critical thinkers in general. Reviews also reveal that Paul's model of Critical Thinking helps in reaching higher level of critical reflection as well in understanding mental processes in a better way (Moreryra, 1991).

Such a comprehensive model can help students improve their abilities to think over variegated domains of knowledge and at the same time preparing them to think more effectively in everyday reasoning tasks.

From the reviews, it is observed that this model has not previously been tested in India empirically and forms a strong basis for its testing in the Indian educational

setting. Further, it can be used by anyone, from primary school students to adult learners, wishing to improve their Critical Thinking. Thus, if effective, widespread use of Paul's model would not only lead to deeper learning and more critical thinking in subject, it should also result in better critical thinkers in general.

The review of related literature provided information on the various modes of assessment of critical thinking. It revealed that there are very few tools available to assess Critical Thinking. The tools like Watson Glaser Critical Thinking Appraisal, Cornell Critical Thinking Test Series and Ennis-Weir Critical thinking Essay Test are the most commonly used tools. These tools are not found to be easily available as well these tools test only certain specific parameters of Critical Thinking. The researcher finds that the Paul's model would require a Critical Thinking skills test to be developed as the parameters do not seem to match with the available tests. After talking to the guide and the experts the researcher has reached to the consensus of making her own test for examining the effectiveness of the instruction for Traits of mind and the standardised test used by Paul for the Analysis of Article Test.

While there is a dearth of studies conducted in India on Critical Thinking, the researcher's work if found to be effective would result into a seminal contribution to the area of Critical Thinking.