

CHAPTER 1

CONCEPTUAL BACKGROUND OF THE STUDY

1.1 Introduction

It is an organized fact that Critical Thinking is an essential concept in education (Lipman, 2003; Freire 1996; Paul, 1990) being propagated from 25th Century B.C. Paulo Freire and Henry Giroux who have profoundly worked in the area of Critical Pedagogy placed an unprecedented emphasis on Critical Thinking by using the words ‘Empowerment’, ‘Self-reflection’ and ‘Critical Pedagogy’. This fact has also been emphasized by various Educational Documents, Policies and Frameworks in India as well as globally. National Council of Educational Research and Training has profoundly recommended braiding Critical Thinking by one way or the other by accentuating upon words like ‘Interpretation’, ‘Active Learners’, ‘Reflective Inquiry’ and many more. National Curriculum Framework, 2005 in its first chapter titled “Perspective” subtitled ‘Aims of Education’ puts up the perspective of learner as the one that has “Independence of thought and action”. This also points to the capacity of the learner to carefully consider ideas, points of view, and decisions and suggests value-based decision making, both independently and collectively. The National Knowledge Commission, 2005 that was considered to be an ‘Indian Think Tank’ and was an advisory body to the Prime Minister recognized the latent force of education and in preparing Individuals to think independently, make informed decisions, and keep abreast of important issues and trends at the local and national level. This idea again has been highlighted by many authors, philosophers and theorists like John Dewey, Edward Glaser and Edward Debono. A stark contrast is observed when education is promoting rote memory, factual knowledge, textbook culture (National Curriculum Framework, 2005) against building decision making and judgment capacities that are products of Critical Thinking (Meghani, 1999). The above milieu strengthens the fact that curriculum must be integrating Critical Thinking as a component of school education system as it involves decision making and builds judgment capacities (Helsdingen, 2010). Even after highlighting this fact, education in general has not been able to successfully implement Critical Thinking as it explicitly

is not dealt by any subject. Even if it exists, it exists in an episodic form. Further, there is a 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 p. 5; Jones & Haydon 2012; Massa, 2014).

According to the report of committee set up by Ministry of Human Resource Development for National Council of Education Research and Training, it is stated that schools should make the efforts to balance between cognitive and non-cognitive physiognomies. It is also mentioned in the report that cognitive objectives dominate the school activities and the non- cognitive purposes are invariably not given importance. This report mentions the fact that minimum set of outcomes must be set in non-cognitive domain also. This report considers Critical Thinking as a life skill and is thus considered in non-cognitive domain. This report initiates the idea of Critical Thinking as a life skill that can be provided to the students through school education and also considers Critical Thinking that can be used to balance out between both the domains.

The teachers have to be trained to take Critical Thinking as a skill successfully in the schools as it will require explicit focus on training them for the same (Hager, Kaye 1992; Facione et al; Reed 1998). The teacher training program can train student teachers for Critical Thinking so that the students can be trained for the same (Kennedy et al as cited in Hager& Kaye 1992 p. 28).

This study aims to make an Intervention Program on Critical Thinking using Paul's Model for student teachers by which the implementation of the same is possible. Before we move to Critical Thinking and its intervention, I would like to see the historical aspect of Critical Thinking to see how the concept has originated and evolved over a period of 2500 years.

1.2 Historical Descent of Critical Thinking

Approximately 2500 years ago, Socrates initiated with this thought not explicitly with the words 'Critical Thinking' but by questioning authorities and by having dialogues within the public gatherings (Paul, 1990; Jones & Haydon 2012; Wang & Zheng, 2016). The concepts like friendship, justice, religious duty, virtues

etc. were addressed and questioned through the dialogical inquiry by Socrates himself (Delic & Becirovic, 2016). He also questioned people for the respect they gave for any authority and submission to any authority. He essentially addressed the idea that instead of submission to power, one must think for oneself for submission to any power and question things that are happening around. He profoundly probed into thinking process of others by asking reflective questions to them to achieve clarity. He identified and recognized the fact that questioning for clarity and seeking information actively that provides for confused meanings for buoyant prerogatives of knowledge, is genuinely essential. Followed by the practices of Plato and Aristotle, emerged the understanding of 'trained mind' to dig beneath the surface of thought process. Aristotle emerged with the idea of logical theory. He introduced the use of reason in theoretical activity. In the middle ages, the official writings of Thomas Aquinas depicted the work on Critical Thinking. He focused on reason in human life. He also gave an insight that, beliefs always may not be questioned, if they are logical and reasoned.

According to Desroches (2006), Francis Bacon laid the foundation of modern science and empirical testing to think critically. The book on 'Advancement of Learning' explicitly mentions the importance of seeking information. He gave the word 'idols' for bad habits of thought. Descartes wrote a book on 'Rules for the direction of mind' where he emphasized on guiding the mind along with intellect as a source that can perceive truth (Paul, Elder, & Bartell, 1997). He also emphasized upon rechecking of the reasoning process. He said that there is nothing that one can be sure of because a man is guided and deceived by his senses. Sir Thomas Moore in same period coined the word "Utopia" wherein he urged people to do all the essential work of the day and then devote the rest of time for intellectual pursuits. He states that, maximum amount of time must be devoted to cultivation of mind to find true happiness (Callaghan, 2014). He thought that every aspect of society needs radical analysis and critical examination of its functioning. Hobbes and Locke in 16th and 17th Century established the fact that everything was subject to reasoning and evidence.

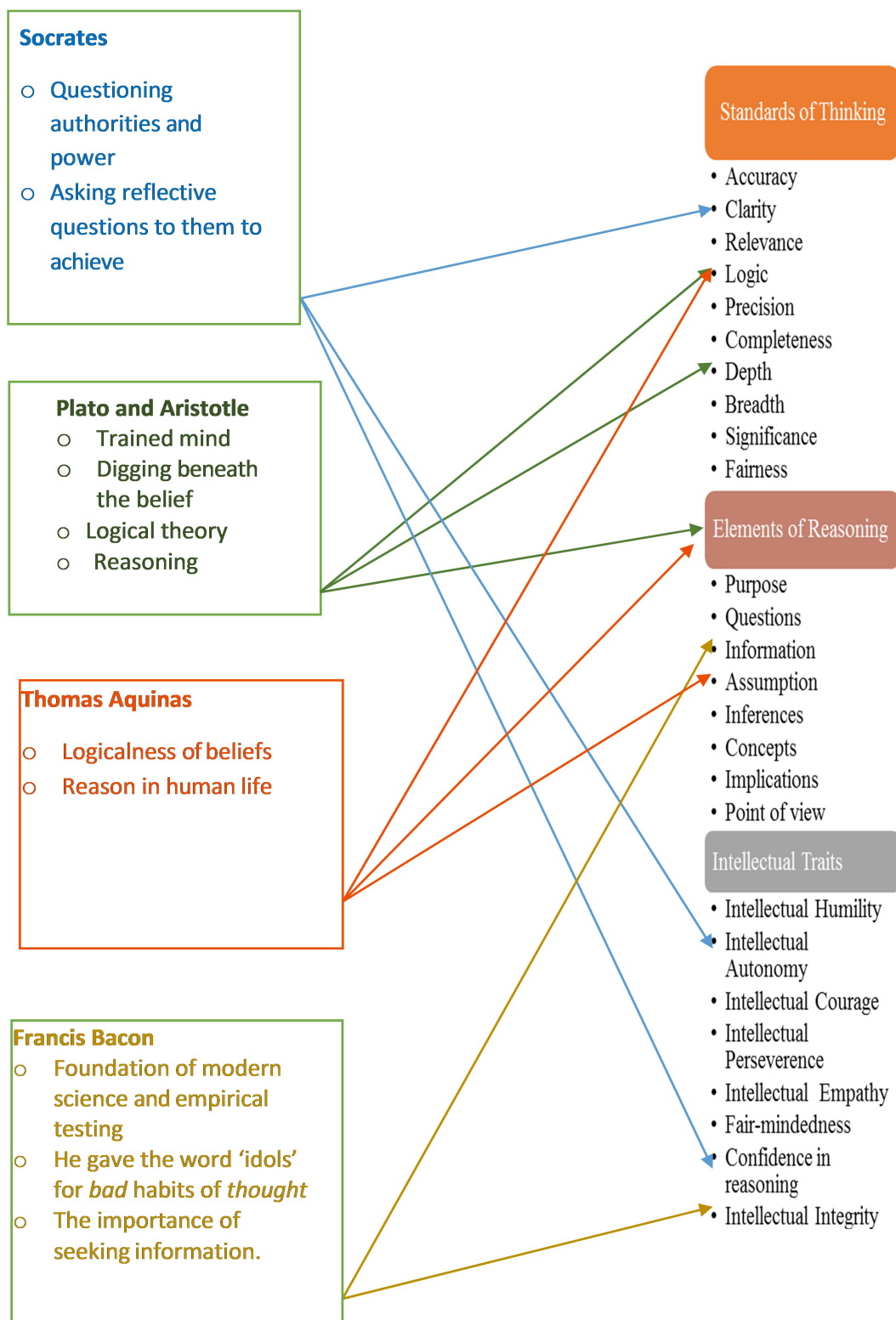
Locke laid the foundation of analyzing and reasoning for everyday life and thought process.

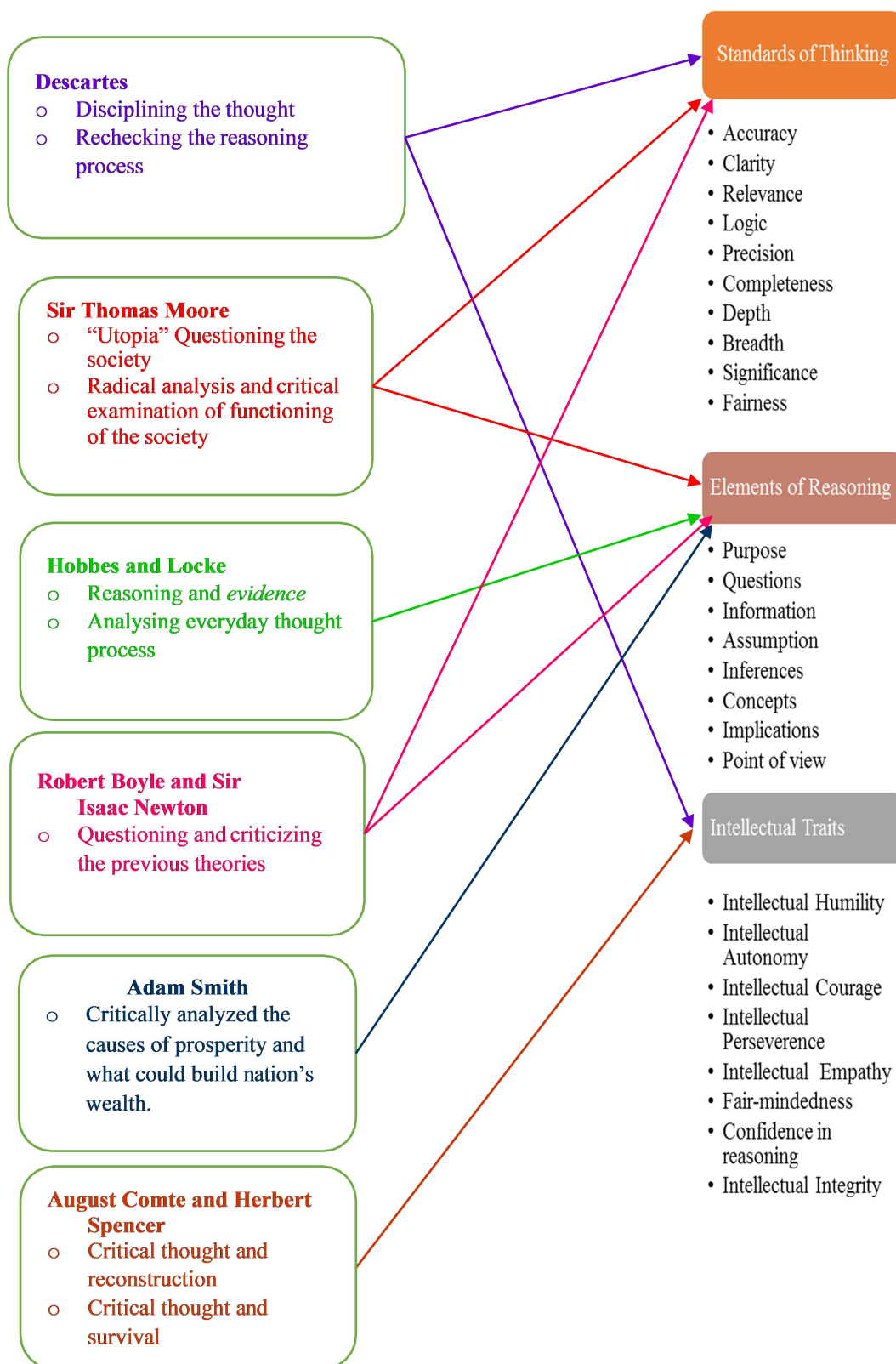
This aspect of critical analysis was seen in the work of Robert Boyle and Sir Isaac Newton. Robert Boyle explicitly mentioned about examination of faith (Mcintosh & Anstey, 2018). They questioned and criticized the previous theories worked out and developed their own framework. Adam Smith's *Wealth of Nations* critically analyzed the causes of prosperity and what could build nation's wealth. August Comte mentioned the idea of 'mind as the servant of the heart'. Herbert Spencer was convinced that society should be restored and rebuilt in accordance with the truths of their philosophy. The work of unconscious mind is reflected in the works of Sigmund Freud (Paul et al 1997). This unconscious mind may affect the capacity of an individual to make decisions. This needs to be reflected upon.

The constructs that comprehensively deal with Critical Thinking from the above review are questioning, logical inquiry, reflective questions, reasoning, rechecking reasoning, unscrupulous habits of thought, information, checking for evidence, disciplining thought process, trained mind, analyzing, and unconscious mind. The need of comprehensive model that transacts the above constructs in one way or other through pedagogy or through its nature itself is felt.

Below mentioned figure comprehensively presents the important pointers emerging from historical thoughts of various thinkers and their incorporation of the significant points in the Paul's Model to Critical Thinking, though the introduction of the model remains in the theoretical framework.

Figure 1 Historical Descent of Critical Thinking





1.3 Connotations of the word ‘Critical Thinking by Various Authors’

As written above, the word Critical Thinking has many connotations and its meaning has changed over the years, focusing upon its various dimensions.

Etymological meaning of Critical Thinking is ‘to know’ (Paul, 1993). The concept has existed over a period of so many years. The word cannot be imagined without Socrates as he stemmed this approach to learning around 2500 years ago. His contemplation for truth made him come with Socratic questioning: a popular tool for Critical Thinking. (Maxwell & Melete, 2014).

John Dewey (1933) stressed the distinction between procedure and outcome in thinking. He broadly looked at it as "Reflective thinking" which is "vigorous, unrelenting, and careful consideration of any belief. Also he emphasized upon considering belief only when there is sufficient evidence to support it. He also used the word ‘rational’ along with it (Kurfiss, 1988).

He definitely did not use the word Critical Thinking but made a reference to it by using terms like conscious, evidence, testimony, regulation of thinking, persistent, systematic and protracted inquiry (Dewey, 1933). That also projects the philosophical aspects of Paul’s Model in the form of intellectual perseverance, confidence in reason and intellectual autonomy.

Glaser’s (1941) incorporated some major elements of Critical Thinking as: an ‘approach of being disposed’, ‘acquaintance of the ways of rational inquiry’ and ‘reasoning’. He highlighted on attitude and skill in applying those methods (Kurfiss, 1988).

In 1950s, Inhelder and Piaget stressed on the importance of the following concepts of reasoning abilities like ‘separation and control of variables’, ‘relative reasoning’, ‘hypothetical reasoning’, ‘co-relational reasoning’(as cited in Kurfiss, 1988, p 28). Piaget and Inhelder’s work profoundly gives a direction to the concept of ‘reasoning’ in any task.

Another early and influential view of Critical Thinking is that of Robert Ennis, in one of his papers, he defined Critical Thinking as *"the correct assessment of*

statements". He also defined it as "*reflective and reasonable thinking that is focused on deciding what to believe or do*" (Ennis, 1985). This provides to a view of accuracy of statements.

Joanne Kurfiss (1988) offered a clear definition of Critical Thinking as: "An investigation whose purpose is to explore a situation, phenomenon, question, or a problem to arrive at a conclusion about it that integrates all available information and that therefore can be convincingly justified". Kurfiss definition also emphasized on process of collection information that is comprehensive so that justification of outcome is reasonable and based on evidence.

Richard Paul and Michael Scriven open up during an International Conference saying that Critical Thinking can be viewed from point of view of intellectual discipline, using blooms taxonomy levels of conceptualizing to evaluating of information involving various sources of information that it gathers from: like reflection, observation, and it might be experience as well.

Fisher (2001) compiled several definitions of Critical Thinking. Recurring terms are persistent effort, careful consideration, thoughtful, logical inquiry, careful reasoning, skillfulness; evidence based seeking, reflective thinking, preparation for decision making and evaluation of arguments. Cottrell (2005) describes Critical Thinking as a "complex process of deliberation which involves a wide range of skills and attitudes". Thus clearly Critical Thinking requires number of processes along with this it requires skills and abilities. This view is somewhere similar to Glaser's (1941) view on Critical Thinking.

Critical Thinking as a skill is a vital because it prevents people from making bad decisions and helps to solve problems. This can be stated based on the definitions and important terminologies stated above.

As Richard Paul and Gerald Noisch witnessed: this skill encompasses sub skills like defining the objective and purpose clearly and accurately. It also includes skills like collecting and organizing the data, review the data, consider the alternative views, view assumptions and take the decision accordingly. It requires reasoning and assessing skills for the decision making.

Education in the above-mentioned context must provide for cases and activities as well as learning situations wherein a student is able to look at all sides of an argument (Facione, 1990), consider the factors that govern the issue (Bailin et al., 1999; Facione, 1990), propose a solution for the situation (Ennis, 1985; Halpern, 1998; Willingham, 2007 as cited in Lai 2011 p.9), implement, monitor and self-correct after it is being implemented so that informed decision making happens at all levels.

Thus, if you view Critical Thinking in its broad sense, it is a thinking which is conscious, effortful and also involves reasoning, accuracy of information, reflective component, and collection of in-depth information, intellectual discipline, attitude and skills to use the above. It does draw attention to the various aspects that consist of Critical Thinking. The significant idea that emerges from the earlier text is that there are numerous definitions, conceptions and aspects of Critical Thinking.

A significant question that arises from the above text is: What can be a comprehensive definition or conception that may entail majority of the aspects cited above? What can be the model that can comprehensively capture the essence of Critical Thinking in terms of various conceptions into the area? Moreover, various models are into experimentation in this significant area. There is no common consensus to definition of Critical Thinking. To answer this: It was observed that significant authors and philosophers like John Dewey, Robert Ennis, Facione, Mathew Lipman, Richard Paul and many more have worked into the area. They have suggested specific models/conceptions to Critical Thinking. Below mentioned ideas attempt on understanding some models/conceptions that have been used in this area for enhancing Critical Thinking.

John Dewey emphasizes on reflective thinking as a key component to suspend judgment. This definition draws out important aspect of Critical Thinking, but is being developed with other authors who have further worked into broadening the definition of Critical Thinking. Ennis definition to Critical Thinking brings in skills and disposition as additional aspects to Critical Thinking. Ennis model to Critical Thinking in Delphi Report came out with a common consensus of cognitive skills that are: interpretation, analysis, evaluation, inference, explanation and self-regulation. These are the core skills of Critical Thinking. Each skill also has various sub-skills. It

is important to note that the experts have agreed to the above skill set but makes it difficult to apply for everyone. Lipman emphasizes on Judgment, contextual usage of Critical Thinking and criteria as concepts of Critical Thinking. If we see these conceptions they have important aspects of Critical Thinking but not all the aspects of Critical Thinking. Another model that is Paul's model to Critical Thinking uses standards of Critical Thinking that can be used to assess the elements of reasoning along with intellectual traits of mind. These intellectual traits of mind as described by Paul are unique with reference to other models and definition. He emphasizes on Cognitive as well as affective dimension to Critical Thinking (Lai, 2011). This conception very well uses majority of the aspects captured from significant authors in Critical Thinking like reasoning, intellectual discipline, accuracy and in-depth collection of information, reflection as a component. It also adds to the aspects of point of view or breadth of information, persistency into inquiry, empathy in doing tasks and handling situations, integrity and so on.

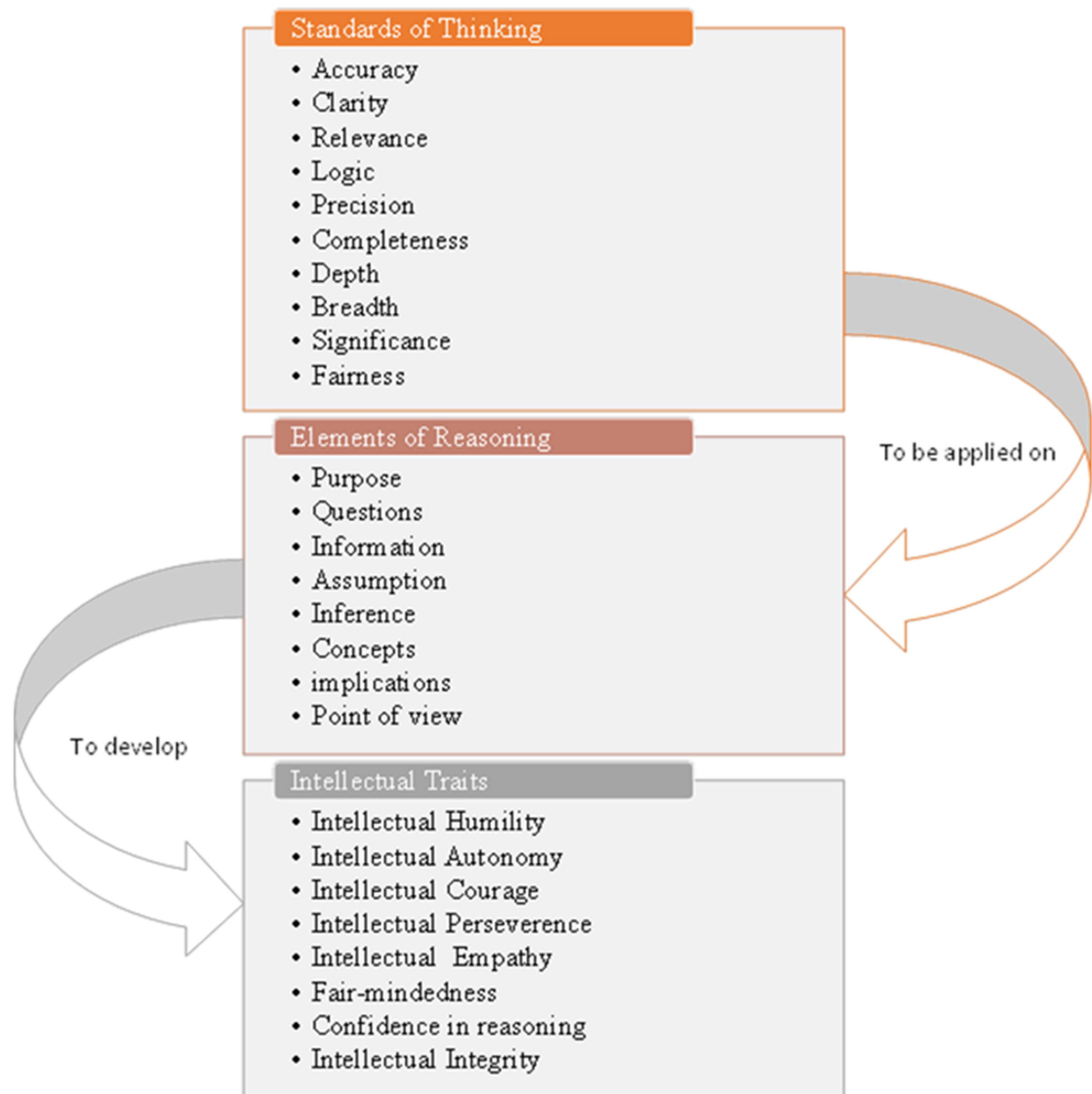
In addition to that, he attempts on integrating Critical Thinking into curriculum to get insights in to the subject. This model as suggested deals with philosophical and cognitive dimension of a human. This makes it comprehensive in its nature. This model seems to capture the essence of comprehensive meaning of Critical Thinking.

Further he has given an approach that basically can be integrated into reasoning through any content and discipline. His extensive range of aspects used in Critical Thinking model uses reasoning, as well as, dispositions required to address the reasoning. This model is quite elaborate in its aspects it covers, and its application can be seen to broad range of circumstance (Reed, 1997). In order to understand more on Paul's Model to Critical Thinking, below mentioned review will help.

1.4 Paul's Model to Critical Thinking

He uses standards of thinking, parts of reasoning and intellectual traits to mean Critical Thinking. Below mentioned figure summarizes the Paul's Model to Critical Thinking.

Figure 2 Paul's Model to Critical Thinking



Richard Paul's Model to Critical Thinking has certain distinct and significant features. The distinct and significant features of Paul's model are necessary to be identified then.

1.4.1 Distinct features of Paul's Model

The model will provide student teachers with distinct features. These distinct features help to understand its significance.

- It has insightful conceptual foundation because the concepts relate to historical roots of Critical Thinking as mentioned above in the concept map.
- It's Theory has relevance to classroom teaching because of standards of thinking that can be used to assess quality of thought and elements of reasoning that can be used to analyze any text, essay, article, chapter or textbook and intellectual traits of mind that has relevance to function accurately.
- It attempts to institute intimate relationship between content and thinking, as it uses the process of thinking to assess and analyze the content (ideas work in systems and any idea in content constitutes logic).
- Emphasizes erudition of the theory of Critical Thinking, and contextualizing this theory in teaching and learning. It can be integrated into educational curricula (Reed, 1998) (content is the product of thinking).
- Emphasizes on a comprehensive fair-minded Critical Thinking facet.
- Provides an array of classroom strategies that enable students to master content using their thinking and to become skilled learners (Reed, 1998).
- Content as a mode of thinking, is its basic philosophy (Paul, 1990).
- Broad set of cognitive skills and affective dispositions.
- Practical and flexible approach.

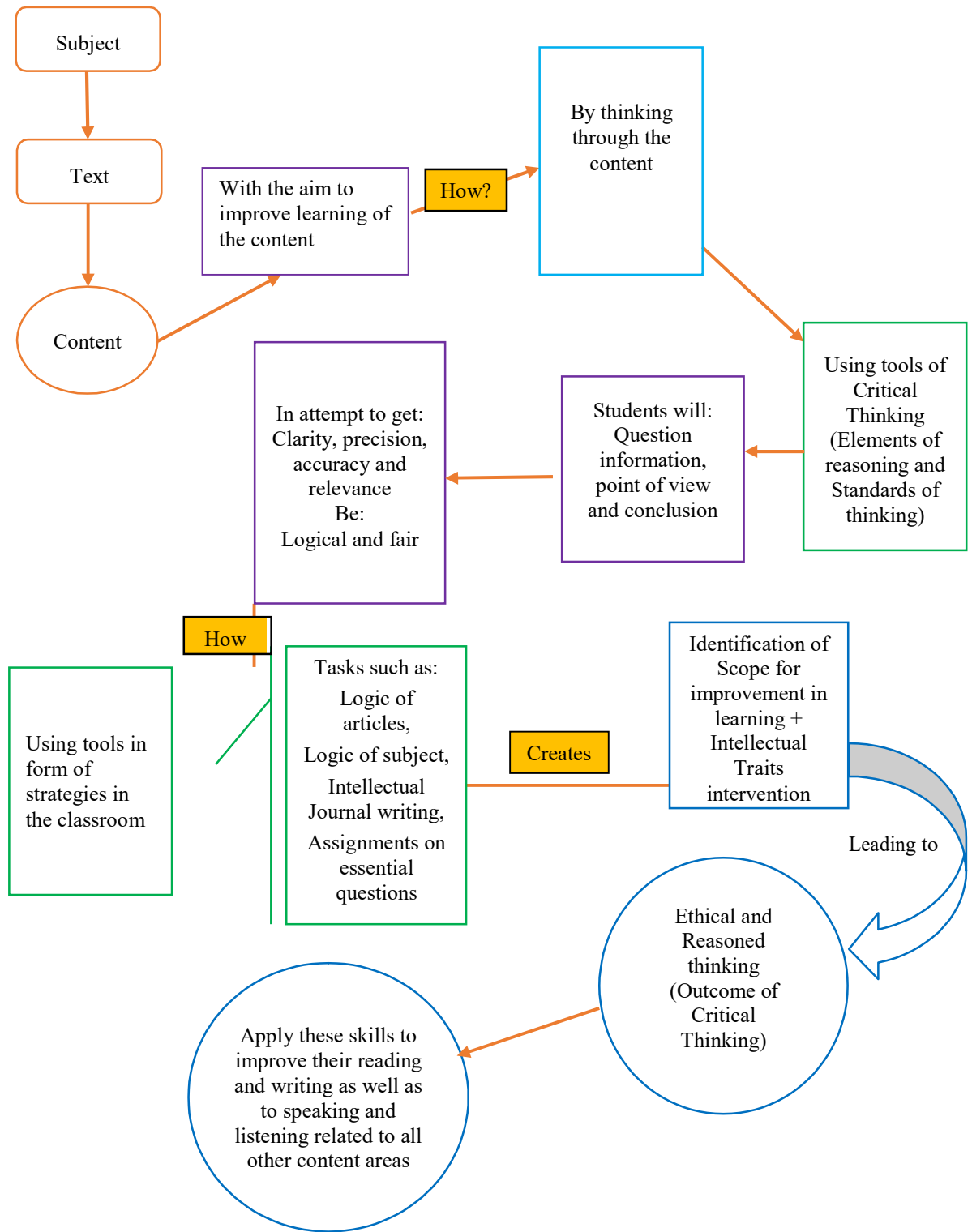
1.4.2 Strategic benefits of Paul's Model of Critical Thinking in the Academic Sphere

Paul's Model to Critical Thinking can improve Student teachers as well as students learning in any content area. The students can use elements of reasoning and

standards of thinking to improve thinking through the content (Elder & Paul, 2003). They can question information, conclusions and point of view in the content.

They attempt to achieve clarity, accuracy, precision, relevancy, depth and breadth in thought process. They view logic as an indispensable aspect of thinking. They use all the aspects mentioned in four important dimensions that is Reading, Speaking, Writing and listening so that it brings clarity. They strive to apply these skills in all domains of life. The students will develop the reasoning skills that will help them to develop other various skills and insights (Reed, 1998). The students will treat all thinking with the same rigor. The students will also expect qualitative reasoning (guided by standards) from those who support or from those who put up opposing views. The students will gain a strong understanding of a strong sense of ethical and reasoned thinking. The below mentioned figure three explains the working of Paul's Model to Critical Thinking, the way it will be used in the intervention program and the conduit that can benefit in the academic area:

Figure 3 Strategic benefits of Paul’s Model in Academic Sphere



1.4.3 Strategic Benefits of Critical Thinking Outside of Academia

Students will not only develop as thinkers but they will also develop as fair-minded thinkers (Paul, 1990). They don't develop thinking to get what they want but develop thinking to become fair-minded, even if that requires them to sacrifice something in that process. In this process the student will be able to catch themselves while acting selfishly (Egocentrism as barrier to Critical Thinking) so that he/she begins to correct this behavior (Elder & Paul, 2010). The student will be able to think of how their behavior affects others (Intellectual Empathy). They will be able to develop intellectual humility, intellectual perseverance, intellectual courage and confidence in reasoning (Paul, 1990). This will help them to see the actual strengths and weakness of any tasks they do. Development of fair-minded aspect requires the person to develop intellectual humility, integrity, empathy, confidence in reason, autonomy, and perseverance. One cannot see oneself as just and right. Intellectual traits have to function in unison.

1.5 The Requirement of Elements of Reasoning

As stated earlier everybody thinks. Thinking is incessantly happening in our minds. Implicitly everybody reasons. But there is difference between thinking and reasoning (Elder & Paul, 2003). To allow humans to clearly think about their thinking process, one has to understand how thinking has been defined and thought about by various authors. According to well-known thinker John Dewey (1933) "Thinking starts from the word thought". If thinking has to be understood in the simplest way, it means something that happens 'in our heads', or that 'goes through our minds'.

Thinking can be formed on our own experiences, fancies, beliefs, prejudices etc. The thought can also be formed by watching clouds observing the shape that it takes. This becomes a part of entertaining oneself with some pleasure that ultimately doesn't form the part of belief. This does not form part of forming belief. But when an inference is generated that the world is flat, then that is a statement that is based on careful reasoning. The earlier thinking about clouds and prescribing a shape to it was just an observation as a product of watching. There went a lot of reasoning behind generating that inference, but when Columbus questioned this reasoning then he doubted the reasoning that went behind it and inquired into it. That's when another

inference based on logical reasoning was generated. Thus he actively, persistently and carefully considered (Dewey, 1933) the reasoning behind the information and came out with other conclusion that was examined (Lambright 1995).

This also constitutes a thought that too, a “reflective thought” (Dewey, 1933). The thought can be a day dream, a belief, disbelief, a bias; it can be a reasoned conclusion. It can be a reflective thought itself. ‘Reflective thought’ precedes ‘Critical Thinking’. This also establishes the fact that it is not automatic thought. When one functions into automatic thinking the thoughts come and go. But when one reflects, one is consciously thinking on the thinking process; analyzing it with the help of reflection, assessing it with the help of reflection and then upon analysis and assessment he improves his thinking. Thus, Reflection helps to think objectively for the present situation.

Reasoning is more explicit and formal. Reasoning is the most crucial skill required by any student. It is most important because content is product of thinking. When the content is to be analyzed, the thinking that has gone behind the content has also to be analyzed. But what does analysis constitutes of is ‘unknown’. Thinking consists of eight parts of reasoning (Paul & Elder, 2003). These eight parts if overtly considered in our thinking procedure can lead to sound evaluation. Because that will help to identify where one is lacking. These parts can be improved then. While one thinks one do have these parts by which we unconsciously go through this process. When this is unconsciously happening then figuring out where the problem lies, is difficult. When this is formally and explicitly done, it results in reasoning. Reasoning helps to defend and argue based on parts of reasoning. This also helps to analyze various things like essay, novel, text, concept, idea, poem, article etc. whatever may be the product that is in front, it’s thinking behind it that has to be analyzed.

Following are the basic parts of reasoning that constitutes thinking:

- 1) Purpose
- 2) Questions
- 3) Information
- 4) Inferences
- 5) Assumptions

- 6) Concepts and Ideas
- 7) Implications

Let's understand them in brief

- 1) Purpose: Thinking begins with a purpose. Purpose meaning to say, it's the intent or aim or objective with which one begins to work. Since reasoning is done explicitly, lot of time must be devoted to understand the purpose of any thinking or thought that happens in the mind. The purpose then should be stated clearly.

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:

- What is the purpose of this thought?
- Why am I thinking this way?
- What is the purpose of this assignment or this task?
- Can the objective of the meeting be reconsidered?
- Is the discussion in line with the purpose or the agenda behind the task?
- What is the purpose of asking this question in the class?
- What the purpose of this subject?
- What is the purpose of this textbook?
- What is the purpose behind making this education policy?
- What is the ultimate purpose of education?

- 2) Questions: Whenever a thought is generated, it basically aims at answering certain questions in the mind. Questions that one seeks to answer from the task, meeting, issue, problem, should be clear, relevant, and accurate. These questions should be stated clearly.

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:

- What is the question that I am trying to address here?
 - What are the questions that are emerging in mind to solve?
 - What are important questions that emerge from this subject/discipline?
 - Is this a relevant question?
- 3) Information: Information is considered to be the key to solve the question on hand. Information refers to data, facts, evidences, concrete experiences that one looks to make sense of things. This information should be precise, accurate and relevant to the purpose of any thought. This information helps to find whether the problem is significant or how the purpose can be achieved.

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well, as in classroom interactions and discussions are:

- What information needs to be considered to solve this question?
 - Is the information accurate and relevant?
 - Do I need to collect more information?
 - Have I left out any information that could have been considered?
- 4) Inferences: Information leads to inferences. Thinking always concludes with some inferences that it generates. Inferences should be accurate based on the information researched out.

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well, as in classroom interactions and discussions are:

- Is my inference accurate and logical?
 - Does my inference logically come from the information or data that I have collected?
 - How did you come across that inference?
 - Is your inference based on accurate data?
- 5) Assumptions: Assumptions are the thoughts that one takes for granted in the mind. The inferences that are drawn have assumptions. These

assumptions operate at the subconscious level of thought (Elder & Paul, 2003).

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:

- Have I explored the assumptions in my thinking process?
 - Have you assumed something here?
 - What has this policy assumed?
 - What is taken as assumption in this theory?
 - Is this subject assuming something?
- 6) Concepts and Ideas: Concepts are the terms that the thinking has to clarify to make sense of things. These concepts can be theories, laws or principles (Elder & Paul, 2003).

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:

- What concept and idea needs to be understood to make sense of things?
 - What is the idea behind this text, poem, concept, and subject?
 - Have I understood this concept/idea clearly?
- 7) Implications: Implications are the consequences that are generated because of the inference made in the thought process. If you infer this, then this is the implication. Any action has an implication or one can say effect of thinking. These implications are to be explicitly considered before stating the purpose. Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:
- What are consequences of this thought?
 - Have you thought about the implications of such thought?
 - Are you implying that....?

- What are you implying when you say that?
- 8) Point of View: Point of view is the way one looks at things. This point of view is established from a particular perspective. Whenever thinking happens different points of view have to be considered so that one can understand the way of looking at things

Reflective questions that can be asked to oneself for identifying the purpose of thought, as well as, in classroom interactions and discussions are:

- Have I considered the author's point of view?
- Did you consider different theories into this subject?
- Isn't your point of view narrow?
- How am I seeing it?
- Am I not able to understand her point of view?
- Am I empathetic enough to understand his/her point of view?

1.6 The Requirement of Standards of Thinking

Thinking is a cognitive process that helps in making right decisions so that the effective fulfilment of desires can happen (Patel, 2010). It also facilitates generation of ideas and actively supports for the search for the meaning of the word. When it supports the process of decision making, then it becomes the most important and essential dimension of human life. In the line of the above discussion, the quality of thought will matter to make our life an improved one or worse (Elder & Paul, 2008). This quality of thought depends upon how well one is able to assess it. The assessment tool will help to accept a thought or reject it (Elder & Paul, 2008).

Acceptance and rejection of a thought depends upon reasoning that goes behind the thought. In adjunct to this, even Socrates recommended asking questions that are thoughtful and reflective, so that innate beliefs can be explored (Paul, Elder, & Bartell, 1997). There is a possibility that sometimes one accepts a thought that is false or based on unsound reasoning (Elder & Paul, 2008). Sometimes we reject the thought that is justified and reasoned. We need Critical Thinking to address this then.

In the article of 'biochemistry of belief' it is explicitly stated that our frontal lobes play the most momentous role in beliefs and our prefrontal cortex is responsible for integrating the information in the sub cortex that basically forms the mental representations of the world. This points to the fact that belief in the brain influences the mental representations that we form for the world. These beliefs are basically processed in Amygdala and Hippocampus and form the thinking process (Rao, Asha, Jagannatha, & Vasudevaraju, 2011). The execution of beliefs is in the form of thinking. So, it can be rightly stated that thinking is execution of beliefs. It also affects our ability to see the truth objectively. Further, research also proves that thinking processes further generates the brain activity through distinct mechanism. It was proved in one of the research that students may have increased the synaptic activity of the brain by repeating the previous processes of synaptic cells and by persistently stimulating the subsequent synaptic cell (Hebb, 1972) because long-term potential (LTP) might produce thinking (O'Keefe & Nadel, 1978).

In this case we need an intellectual intervention in terms of standards of thought. These standards of thought can become a tool of intellectual intervention so that one can grasp the reality. These are known as intellectual standards. The six criteria given by the investigator is arrived by Richard Paul through this standardized model named, 'Paul's model to Critical Thinking'. The word 'intellectual' comes from the word intellect, which means a person's mental powers. According to Oxford Dictionary it means the faculty of reasoning and understanding things objectively, especially with regard to abstract matters. It also means the use of reasoned capacities to guide a thought process. It also projects the presupposed faculty of reason of a human being to solve issues, workout through problems, make fair judgments, understand concepts and evaluate reasoning. According to Oxford Dictionary, the word standard means criteria or a principle or a model. It determines quality of anything. The word 'standard' paired with intellectual will establish criteria for standard of thought or criteria for thought. It further needs to be understood as to what are the criteria's or standards by which we can assess a thought.

Following is the list of standards that are universally accepted for assessing the thought process. These standards of thinking provide with a check on reasoning so as to assess:

- Clarity
- Accuracy
- Precision
- Relevancy
- Depth
- Breadth

Clarity:

Clarity is one standard for the quality of thought. If the thinking is not clear, it cannot communicate the right things. If its not clear it cannot take the right decisions. If thinking is not clear it is muddled, fuzzy and confused. The implications are unclear decisions, unclear concepts, unclear communication, unclear written work, unclear reading and many more. The thought is clear to the extent it can elaborate, illustrate and exemplify.

Clarity can be established, in thinking if we reflect on the thinking process to answer the following questions to ourselves:

- 1) Am I clear?
- 2) Do I need more elaboration on this?
- 3) Am I able to illustrate and exemplify for the concepts that I am clear with?
- 4) Do I have any questions to establish clarity of thought?
- 5) Am I confused and feeling muddled in my thoughts?

During the conversation with or while interacting with students, some questions that can be asked are:

- 1) Can you elaborate on the idea?
- 2) Can I repeat what you just said now?
- 3) Can you give an example of this concept/idea?
- 4) Can you give an illustration of the idea/concept?
- 5) Can you explain the idea in some other words?

Precision:

Precision refers to the specificity of thinking. Specificity in thinking can be established through data, proofs, evidences to understand the concept/idea or issue/problem. For ex. If I think that Riya is dishonest/honest, I bring in lot of experiences from varied people, I observe her in majority of the situations to show her general tendency, then I can say that she is what she is. It also focusses on the detailing that goes into bringing precision of the concept/idea.

Precision can be established in thinking, if we reflect on the thinking process to answer the following questions to ourselves:

- 1) Am I being precise in my thinking?
- 2) Am I thinking in detail?
- 3) Do I have enough evidence to say what I want to say?

During the conversation with or while interacting with students some questions that can be asked are:

1. Can you be precise in what you are saying/thinking?
2. Can you be more specific?
3. Can you provide me with enough details?
4. Can you provide me with enough data, evidences to convey what you want to say?

Accuracy

Accuracy refers to thinking that is free from errors and mistakes. Thinking should represent as to what it is. It should not misrepresent. Thinking should be what it conveys. For ex. If one professes something but says something he/she is not accurate in how he/she thinks.

Precision can be established in thinking if we reflect on the thinking process to answer the following questions to ourselves:

- 1) Am I accurate enough?

- 2) Have I checked the facts that lead to this thought?
- 3) How can I check what I am saying is true?

During the conversation with or while interacting with students some questions that can be asked are:

- 1) How can we crosscheck this thought that has appeared in your mind?
- 2) Is this really true?
- 3) Have you checked the evidence/proof it has cited?

Relevancy

Relevancy refers to the thinking in question. We begin with one thought, but it leads to another. So the thoughts on hand should conform to the thinking in question. If not, it's not relevant. The related thoughts that are emerging from the significant thought in question should align. Thinking should not go astray.

Relevancy can be established in thinking, if we reflect on the thinking process to answer the following questions to ourselves

- 1) Is my thinking relevant to the question on hand?
- 2) What other relevant thoughts can be considered to be relevant?

During the conversation with or while interacting with students some questions that can be asked are:

- 1) Whatever you say over here in the discussion, does it have a bearing on the issue that we are thinking and discussing about?
- 2) Is this idea relevant over here in the conversation?

Depth

Depth refers to various complexities of thoughts, understood to address the issue on hand. Thinking can be superficial, if complex relationships of thoughts are not understood. Complex decision, complex concept, requires complex interrelationships to be understood.

Depth can be established in thinking if we reflect on the thinking process to answer the following questions to ourselves

- 1) Have I looked into the depth of this thought that has occurred in my mind?
- 2) Have I considered various interrelationships here?
- 3) Is this thought complex?

During the conversation with or while interacting with students some questions that can be asked are:

- 1) What made you think that this thought is significant?
- 2) Have you considered various interrelationships of variables connected to this thought?

Breadth

A thought has to have breadth (Paul, 1990). Breadth means, it must understand a thought from various perspectives. Thinking can't be narrow-minded, but the thought has to be understood from various perspectives.

Depth can be established in thinking if we reflect on the thinking process to answer the following questions to ourselves

- 1) Have I considered the issue from various perspectives?
- 2) Have I considered opposing viewpoints?

During the conversation with or while interacting with students some questions that can be asked are:

- 1) Have you thought about it from various angles?
- 2) Is your perspective narrow one?

1.7 Role of Intellectual Traits of Mind

Understanding the role of elements of reasoning to analyze the thinking process and then going ahead to assess the thinking, provides a double check on the thinking that one is undertaking. With these tools, one can surely develop as a Critical

thinker but may not as a Fair-minded thinker. It is possible that the skills that one acquires through reasoning skills and standards be used for manipulations, seeking self-serving ends; dominate, for fallacious talks etc. There seems to be no end to use reasoning and assessment skills in a tapered, selfish way. To avoid the wrong use of the skills or to develop as thinker, yet not as a selfish thinker, one must develop the traits of mind. These traits are known as Intellectual Traits of mind. These traits help to keep a check on natural motive of mind, to pursue goal without considering the rights and needs of others, that is to become 'SELFISH'. These traits of mind act as a guide to intellect (Paul & Elder, 2013). They can help to catch the mind that may act in an irrational way. It is quite natural that students may notice faults in others thinking but not in their own because they have developed the capacities to analyze their thinking. This tool helps to guide the thinking process to notice one's own fallacies in thinking process if any. For example, a politician may attempt to find out fault in the thinking process or ideology of the opposition party, even if the idea may seem to be fine. Intellectual trickery is an art that the students find easy to connect with. This way they attempt to use reasoning skills to show reasonable thinking to be unreasonable and unreasonable thinking to be reasonable (Paul, 1990).

Fair-mindedness in the form of intellectual traits provides a tool to assess one's own strengths and weaknesses in the thinking process which otherwise would have looked quite pragmatic. These traits of mind are: Intellectual Humility, Intellectual Courage, Intellectual Perseverance, Intellectual Integrity, Intellectual Empathy, Confidence in Reason and Intellectual Autonomy.

The discussion on the component traits of Fair-minded thinkers is mentioned below:

Intellectual Humility:

According to Paul, It is the ability to develop the extent of one's own ignorance. It amounts to acute awareness of ignorance in one's own thinking. It means knowing biases and prejudices in one's own thinking processes. If students strive to understand or know where do they lack in their content and accept the same then they can strive to understand the content that lacks and make the unknown

content, known. This ability will help the students to discover the unknown while accepting what is known and unknown.

Why this is important?

Humans naturally are pretentious and boastful of what they do. This makes them indulge into self-deception and claiming more than they know. It makes the person pompous and indolent. Thus, Intellectual Humility involves differentiating between learning that is deep and learning that is superficial

Intellectual Courage:

Intellectual Courage means fairly facing ideas, beliefs and viewpoints even when it is painful for one to do so (Paul, 1990). Students have varied perspectives with respect to any situation, text or an event. The idea of contrary viewpoint to one's own is always rejected or taken up negatively. This can help to recognize the fault within one's thinking process. It further refers to ideas that are considered dangerous by the society may be rational and the ideas that are rational may not be. For ex.

Abortion may be considered irrational in some religion but then for an individual, depending upon his context and situation may be ideal. Not allowing someone to take decision in this situation may result into problems. Furthermore, considering the rationality of the decision, various penalties may be imposed on this person by the society. The idea behind not accepting any viewpoint may be because of fear of rejection. This will not help a student in this case to improve, if opposing viewpoints are not considered.

Why this is important?

Once students are open to opposing viewpoints and beliefs, they can become more open-minded and thereby more fair-minded. Accepting faults that one has within will help to identify the problems in thinking which is quite natural. Rectifying them will help to become fair-minded thinkers.

Intellectual Empathy:

According to Paul Intellectual Empathy means to put imaginatively into the shoes of others. Students need to understand the viewpoints, opinions and position of others. This will help them understand others in a better way. This will help to reduce conflict as understanding will develop. Students will further develop the ability to appreciate opinions coming from different situations, contexts.

Why this is important?

This will help to reduce human disagreements within themselves. When you try to understand others in difficult situations major problems get resolved. For ex. a person not able to cope up in the classroom due to English language usage, may require help of students who may be well versed in it. The student well versed in it, if understands the students difficulty in such situation will willingly help this student and will grow together.

Intellectual Perseverance:

As stated by Richard Paul, Intellectual Perseverance is the ‘ability to work one’s way through intellectual complexities, despite the frustrations inherent in the task’. The issues or complex concepts require lot of efforts to understand it. They don’t have simplistic answers. Such Intellectual Perseverance is displayed when the mind struggles to find answers to such problems. When the mind continuously struggles and does not give up to such situations, it amounts to intellectual perseverance.

Why is it important?

These traits provide students with valuable insights into understanding a subject or a concept. Intellectual laziness will refrain from gaining insights as the mind will soon get tired to go into the depth of the concept. Intellectual perseverance will help students to strive to understand opposing viewpoints, strive to understand a complex concept as well as complex problem. The understanding will not be superficial as mind has worked a way out to understand it. Even closely analyzing our

beliefs will require working hard into it. Working Fair-mindedly requires constant and continuous work into the situations.

Intellectual Integrity:

According to Paul, Intellectual Integrity means ‘holding oneself to the same standards as one expects others to’. That is expecting the same from one’s own self as from others. It is a state of mind where one is true and honest to oneself and notices the inherent contradictions in his/her thinking process. We actively hide our hypocrisy and expect others to meet high standards that are set up by us. When it comes to us we don’t or we hide ourselves portraying hypocrisy. Although we are dishonest to our own self and to others we actively hide it out from us and from others giving reasons that are not rational and justifying. This amounts to intellectual hypocrisy.

Why is it important?

As per Paul, hypocrisy is a form of injustice, as we profess something and do something. Thus, it is required for students to be true to their own thinking process so that they pursue truth because its truth and do not hide out.

Intellectual Autonomy

According to Paul, intellectual autonomy means thinking for oneself while adhering to the standards of rationality. It means reasoning out with the issues by one’s own self rather than depending on others to do so. This trait does not allow us to uncritically accept viewpoints, positions and thinking of others. It asks to think independently through myriad of issues that one faces. This trait allows the person to evaluate the practices, traditions and customs, which are part of everyday life. It asks to reconsider the issues by reasoning through it

How it is important?

There are social, religious institutions that basically ask to conform to the values imposed by them. This trait does not mean that valuing one’s own thinking but this trait allows the person to think for oneself, rather than accepting the status quo. This independent thinking will ask the student to reason out with different

perspectives. This will make the students evaluate the merits and demerits of any task and thus become fair-minded in the course.

Confidence in Reason

According to Paul, Confidence in Reason is based on the belief that people should come to their own conclusions based on their rational capacities. One must be moved by good reasoning. Good reasoning means reasoning that is based on data, evidences, and proof. It means one must reason clearly, accurately, relevantly, logically with information that is accurate and relevant to the context existing. If we are given chance to think we may think based on intuitions, astrological point of view, faith, belief in certain Gods and many more. This seems to be a natural impulse that governs thinking. But one must logically analyze and assess thinking process. This analysis may lead to several inconsistencies in the thinking process.

Why is it important?

If one thinks to become fair-minded he has to give importance to reasoning. He has to analyze and assess so that inconsistencies are revealed. This reasoning when done logically and with evidence may require us to change our thinking. Thus in the process becomes a fair-minded thinker.

1.8 Factors that can act as Barrier to Critical Thinking

Critical Thinking is thinking about one's own thinking process to accurately check, where one can improve. If the thinking is influenced by group thinking or by selfish interest it will not accurately allow to improve because the reality is being falsified by the barriers to Critical Thinking that is Socio-centrism and Egocentrism. Below mentioned text elaborates on the two paramount factors that act as barrier to Critical Thinking.

Socio-centrism

We live in world wherein we socially interact with people. We usually try and fit into social groups. These groups carry their own way of thinking, beliefs and perspectives. A person that fits into the groups also tries to fit into the thinking,

beliefs and perspectives of the group. This leads to distorted thinking and in turn the decision. The group thinking that overpowers the individual thinking is a distinct aspect of socio-centric thinking. Group selfishness, group conformity, group control and group validation are the key characteristics of socio-centric thinking (Elder & Paul, 2003).

Egocentrism

According to Webster's dictionary human ego-centrism is the natural human tendency to view everything within a world in relationship to oneself to be self-centered. We naturally are born to think and act for selfish motives. We always strive to gain selfish interest and validate our own way of thinking and acting. We tend to forget things that don't support our own thinking, we tend to be with people that support our thinking again leading to distortions and thus leading to unclear reality. The decisions we take also suffer from such egocentrism. This characteristic results from a mind that is undeveloped and not trained to think critically. With the model in use the qualities that a critical thinker can develop are:

1.9 Qualities of a Critical Thinker

- A critical thinker develops the understanding of clarity (Bailin et al 1999), relevancy, accuracy, precision, depth, breadth and significance that can be applied to any situations, issues or academia.
- They further develop the understanding of elements of reasoning like purpose, information, assumptions, point of view, inference and implications with which they can reason through situations, issues and academia.
- They strive for reasoning (Bailin et al & Paul, 1992).
- They finally develop the understanding of intellectual traits that help them to have the awareness of humility, empathy, perseverance, integrity, and confidence in reason and autonomy that aids them to lead disciplined life.
- They figure out things to understand the thinking of other people (Facione, 1994).

- A critical thinker can't always believe what people say. They inquire into the truth and ask questions (Facione, 1994). They want to make world a better place. They put themselves in others shoes.
- They always think that the world isn't a nice place to be if people are not empathetic and integrate towards their thought process. Fair-minded critical thinkers strive for intellectual traits of mind. These traits define how their lives are, how they learn, how they communicate with other people, how they see the world.
- Linda Elder who is a president of Critical Thinking community said, "Critical Thinkers realize that Socratic questioning will lead to just and fair-minded world.

Good teachers cultivate Critical Thinking (intellectually engaged thinking) at every stage of learning, including initial learning.

1.10 Transacting the Vision of Education: Addressing the Symbiotic Relationship of Teacher, School Education and Teacher Education Program to Transact the Vision of Education

Schools are the microcosms of the world (National Council of Education and Research and Training NCERT, 1979). It is a crucial unit that provides students with formal education. The aim of education has a strong background in the ancient scriptures as well as in the formal documents (National Policy on Education NPE, 1986). The vision of education has been taken from many ancient scriptures, holy books and formal documents. If we refer to 'Gita' it uses three similes with reference to the word 'Gyan' (National Council of Educational Research and Training, N.D).Gyan which means knowledge is being compared with words like 'sword', 'boat' and 'fire'. It uses the word 'Sword' to convey that it will remove doubts, confusions and suspicion. It compares gyan with 'Boat' to convey that it helps to cross the sea of ignorance and with 'Fire' so that it will burn one's own mistake. (Rajput, n.d)). Further, in ancient India, the Vedas, the Upanishads, the epics gave thrust on value education in the context of Indian society. Imparting value education was the main endeavor of the teachers of the ancient age (Pathania, 2011).

So in India, education was used as a tool to make ‘Shishya’ think about one’s own thinking to remove doubts, confusions, ignorance, and conducting oneself in a way that will not repeat mistake. It specifically strived for ‘Value Education’. If the attention is drawn to the formal document i.e. National Curriculum Framework, 2005; it mentions the broad aim of education as independence of thought and action, being empathetic to others, apply the learning in situations that come anew and also participate and contribute to processes that will bear economic and social change.

Swedish educator, Tortsen Husen (1974) and Hutchins (1975) coined the phrase ‘*The Learning Society*’. This concept of learning society meant lifelong learning was emphasized upon by United Nations in its reports of 1972 and 1996. (As cited in India Vision 2020 p.5)

Francis Bacon said ‘knowledge itself is power’, stressing the point of mind power and upholding the supremacy of it. Thus, he professed the emergence of the knowledge society. The demand of intellect/wisdom and intelligence is evident from the above discussion. Globally, education was meant to provide the students to understand that process of learning never ends.

The emphasis on mind power is largely significant from above discussion. Three things emerge as important here: teachers, teacher training programs and the model of Critical Thinking; also to some extent the pedagogy for transacting it. Furthermore, if such are the significant, justifiable and fair aims of education, the question arises as to, “Do we have teachers who are well equipped and trained to transact the vision of education? Will the Paul’s model to Critical Thinking support to transact the significant aim of education sighted above? If it’s not, then how can the teachers be trained to achieve the same? This demand of intellect can be met only with the teachers who are crucial to transaction of the same.

1.10.1 Fulfilling the Purpose of Education through Teachers

Critical Thinking is considered to be a core value to be taken up by the schools in education (National Council of Educational Research and Training, 1979).

Education can never take place in programmed environment, where the individuals are treated as doing things just like objects do, but not as ‘thinking minds’ that think and question. The teaching learning process involves that the teacher and the learner interact with each other, exchange thoughts and ideas, ask and answer questions, etc.

One end of the string of Critical Thinking lies in the teacher’s hand wherein he/she creates the environment that is conducive to the transaction and development of Critical Thinking. If the change is to be seen at a broader level it must be in a teacher and the teacher is naturally a product of teacher education program.

According to Planning Commission, the push of teacher education programs must go to developing thinking capabilities in student teachers. In that case present teacher education program that calls attention to memory will have to be appropriately modified. Teachers become important to transact the vision of cultivation of thinking and intellect of mind. This aim requires cultivation of Critical thinking into teachers as well change in methodology of teaching, as teachers function out as a linkage between student and apparition of education. Today also majority of the classrooms in the schools remain dominated by the teachers that use teacher centric methodology (National Council of Applied Economic Research NCAER, 2018).

1.10.2 Teaching Learning Practices

If we generally look at teaching learning practices, students are taught in lectures with a straight forward unidirectional delivery from a lectern. Sometimes questions may come up in the class, the discretion to answer them and encourage further questions rests with the teacher. Students are expected and encouraged, to affirm and ask rhetorical questions, factual and superficial questions (National Curriculum Framework, 2005). At times students collectively speak aloud and in unison; in general the response is a short text recalled from memory. Also the answers that the teachers seek in the test and assessments are expected to come out of the textbook and need not be created (National Curriculum Framework, 2005). It is also observed that students are given questions in the form of question banks so that they can rote the answers of the same and clear the highly scripted exams. This reveals the rigor with which the content is expected to be understood by the students.

According to Lunenburg, (2011) in classrooms where some learners are not prepared to respond to questions or other stimuli immediately, the teacher needs to allow more time after posing questions so that they can process information. Teacher expects immediate responses for the questions posed restricting students from thinking through the key concept and ideas in the discipline. Such learners understand that memory recall that is answer to factual questions is important than thinking and reflecting on things. This way they reduce the mental exertion that is required while thinking (Lunenburg, 2011). It is clearly evident that students neither know to pose essential questions nor do they value the same. This requires change in mindset as well as training the teachers for modifications on teaching learning practices by integrating Critical Thinking into the classroom culture.

1.10.3 Role of Definitive Textbook Culture

One of the highest-flying features of the typical Indian style of teaching lies in the supremacy of textbook use (National Curriculum Framework, 2005). The emphasis on the textbook as the be-all, end-all of classroom instruction is most appositely described in the phrase coined by Krishna Kumar in the following, “The basic norm of this culture was to treat the prescribed textbook as the de facto curriculum, rather than as an aid. The teachers taught the text by elucidating it, by asking children to duplicate and learn it, and lastly by training them to answer and remember questions that were based on it” (Kumar, 1986).

Careful consideration of textbook is important which is somewhere observed in Indian style teaching. But when it is treated as be-all and end-all it will lead to just reading of the text, explaining and isolation of questions here and there within some texts (Ministry of Human Resource Development MHRD, 1993). The systematic inquiry of the text in terms of why this text is so very important is to be considered, or why it is being stated in such a way, what are the major implications that this text looks up at (Paul, 1990). What are the assumptions that the text considers or what inferences does it attempt to make. These are certain questions that will strike an inquiry into the student teacher if she does it herself and also as a home assignment that can be given to the students to think about the reflective questions. This will generate new pieces of inquiry and exploration into their own subjects. The ‘thinking questions’ in isolation can’t lead to thinking skills being developed in a systematic

way. These thinking skills titled as ‘reasoning skills’ become important to analyze any text, chapter, essay or author’s line of reasoning that is presented in front of us. No posing of such questions will only lead to no inquiry into any new piece of idea of the text and a superficial view of the content in front of students.

The cultivation of intellect or using mental/ cognitive processes are rare or barely touched because of teacher centric methodology. The teachers equipped with Critical Thinking will require being open to views in the classes, require reasoning to be used in the content that they teach and also emphasize on value oriented teaching based on intellectual traits required. They will also value the use of such pedagogies that will entail Critical Thinking into classrooms.

It is a crestfallen, but an unchanged fact that classrooms remain dominated by teachers and students, are passive listeners. The teachers will have to become critical thinkers themselves first and have to be well equipped with the Critical Thinking skills strategies that can help them to transact the same. NCERT, 79 says

- *Teachers conduct the symphony of education. Success of the initiative for values development in students substantially depends on the vision, motivation, skills, attitudes, values and behaviour of teachers themselves. It is for this reason that a teacher is compared to a gardener who plants seeds of knowledge and values in students, waters them with care and kindness. It is his/her attitudes, values and relationships that determine the nature of the classroom climate. This is particularly true in the Indian context where teachers have always been respected as the fountain heads of knowledge and wisdom. The importance of teacher is reflected in the common saying what I teach is what I know and what I educate what I am?*

Then this redirects the attention to teacher education programs for educating them with thinking and Critical Thinking skills explicitly.

1.10.4 Role of Teachers Training In Integrating Critical Thinking with The Content

Bentley, Fluery and Garrison (2007) acknowledge that the way pre-service teachers are trained will determine the usage of Critical Thinking into their classrooms teaching learning practice. They also put forward a fact that the teachers should be trained to strategies that can integrate Critical Thinking into instruction so that it enables them to use them in the class. (Cotton, 1991).

This study also aims to provide not only with enhancing or looking at Critical Thinking but also with the strategies with which it can easily get transacted in the class.

1.10.5 Teacher Education Program in Vadodara

Vadodara is multicultural city. There are two English Medium teacher education programs running in Vadodara. One is run by Maharaja Sayajirao University that is managed and controlled by state government. Another English medium University is Navrachana University which is established under Gujarat State government Act. This university has an intake of 50 students for the two-year B.Ed program. Navrachana University has been selected as a sample for the research study due to proximity of conducting the classes, for close observation of student teachers while the experiment is in process and as researcher is part of the faculty of Education department. This makes it easier for the researcher to access facilities of the school and also allows the researcher to conduct the intervention program for one complete semester that is for 50 hours.

1.11 Assessing Critical Thinking Skills

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. Moreover, 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. Thus, the researcher has used Paul's Standardized test to assess Critical Thinking skills with reference to Standards of Thinking and Elements of Reasoning. The researcher has also developed and validated test that will assess the Intellectual Traits of Mind. It aims to use quantitative scores of both these tests to check the effectiveness of intervention program. The researcher also aims to use qualitative tools to assess the effectiveness of the intervention program. It uses Profile studies, Focus Group Discussion and Descriptive Feedback in qualitative research. Studying Profiles so that in-depth understanding of the phenomena is available along with Focus group discussion which allows the researcher to begin with a question that will trigger the participants to answer the question with clarity of thought was conducted. Focus group discussion allows the researcher to probe beneath the thought process. The descriptive feedback would allow the students to give answers for the specific questions based on their perception for the intervention program.

1.12 The Need for the Study

According to Giedd & Chief (2012), the researcher on brain development, the prefrontal cortex is responsible for controlling the impulses and performs the executive functions like analyzing, assessing, planning (Yuan & Raz, 2014) and many more. These functions are under the umbrella skill of Critical Thinking. The Pre-Frontal Cortex is also responsible for logical reasoning (Siddiqui et al, 2008) and to think about thinking process. This part of the brain is most developed when one thinks critically. Again, if this is well developed it makes us more logical and reasoned.

Thus, from this point of view the need emerges for Critical Thinking because it will also help to develop the frontal cortex and thus help in controlling impulses as well as generate better thinkers.

Further, if one goes beyond then the students are exposed to rich information that has several ends and choices. The need for critical thinking for making ethical choices and in maintaining and developing the citizenry for responsible and rational

decisions is increasingly becoming important (Edwards, 2001; Halpern, 2003; Pithers, 2000 as cited in Marin & Halpern, 2010). The bearing of information can be effectively handled only when thinking skills are developed in an individual (Marin & Halpern, 2010).

In spite of the various documents emphasizing education which initiates thinking in a child and the research that reveals that it develops the neo-cortex, the methods adopted in major cases and schools are traditional methods of teaching. The innovative methods prescribed by National Curriculum Framework, 2005, remains in the form of prescription. The traditional methods wherein the teacher questions and the child answers still exists. The child asking questions in Indian family as well as school is acceptable but not welcomed. Furthermore, questions are asked to clear doubts and not which will project a new dimension of thinking or concept.

If we see childhood, stringent norms and culture of the family makes a child to believe that questioning is not desirable and thus accept the knowledge provided by the teacher 'as it is' is important. The continuous comprehensive evaluation still remains an island that is not explored. The students who memorize and write well are considered intelligent and to be followed. The photocopied answers in examination are considered great, reliable and authentic. Applicability of the content is negligible thus leading to problems like unemployment.

Sadly, also studies of higher education by Paul, Elder and Bartell (1995) on 38 public universities and 28 private universities conclude that: 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.

Right from a child's home to school a strong need is felt to allow a child to question, to suggest, to share and to be independent. This requires education to focus new dimensions of thinking which will not only motivate students to ask questions

but suggest a new idea of the concept itself. This will require a child to develop Critical Thinking.

1.13 Conclusion

The concept of Critical Thinking in Education is emphasized by many authors, philosophers and educational documents in India. The braiding of Critical Thinking in Education is required and must as per 21st Century Skills. The strategies required for integration of Critical Thinking with Education are not known. The meaning of Critical Thinking is viewed from many points of view. A substantive model that integrates the philosophical as well as cognitive dispositions is required. Thus, this study aims making an intervention program that integrates a comprehensive approach to Critical Thinking so that purpose of Education for Critical Thinking is met.

The Study is titled:

‘Developing, Implementing and Assessing an Intervention Program based on Paulian Approach to Critical Thinking for Student Teachers of Vadodara’.

The Objectives of the study are:

- 1) To develop an intervention program of Critical Thinking for the student teachers of Vadodara.
- 2) To implement the developed program of Critical Thinking on the student teachers of Vadodara.
- 3) To study the effectiveness of the implemented program on the student teachers of Vadodara.

The next chapter will be dealing with

- 1) Reviews of related literature
- 2) Chapter three focuses on methodology of the study.
- 3) Chapter four: intervention program
- 4) Chapter five: data analysis and interpretation
- 5) Chapter six deals with discussion