

CHAPTER 6

DISCUSSION OF THE STUDY

6.1 Introduction:

This research study comes out with an explicit concern for Critical Thinking to be transacted to student teachers as they become between students of the schools who will most benefit with these Critical Thinking abilities. The purpose of this study was to enhance Critical Thinking abilities of student teachers and in turn get equipped with the strategies and pointers that can be used while they can transact the same to the student teachers. Equipping the student teachers with the strategies becomes important over here because it is proved and known from review of related research that firstly, there is lack of common ground on the meaning and definition of Critical Thinking and second, the aspects that uniformly constitute Critical Thinking (Reed, 1997). It is also not known how to transact the same when different views are available for the same. Thus, the study addressed dual concerns; first enhancing Critical Thinking skills of student teachers and second which ultimately got emerged from the research and is not a research objective but was to some extent fulfilled that is; method, strategies and approach with which it can be transacted in the classroom. Equipping the student teachers with some pointers, strategies to incorporate into the teaching content and classroom functioning. Furthermore, since it was known from review of related research that the Paul's model is comprehensive model to transact Critical Thinking as it draws philosophical and psychological aspects and makes it a rigorous and encompassing theory of Critical Thinking (Kuhn, 1992; Kurfiss, 1988; Marzano et al., 1988; Quellmalz, 1987; Weinstein, 1995 as cited in Alemu, 2016)., the researcher wanted to know through this study whether it is effective in Indian

Context. Thus, the study emerged with following research questions, objectives and findings.

Research Questions:

1. What is the need of Critical Thinking as a subject in Teacher Training program in the present context?

2. What should be the design and the package for developing Critical Thinking in the student teachers based on the approach?
3. How can Paul's approach to Critical Thinking prove to be effective in training student teachers for improving Critical Thinking skills in the Indian Context?
4. What will be the Change in the level of Critical Thinking among student teachers' after the implementation of the package?
5. What is the impact of the intervention program in various domains of life on the student teachers'?

Objectives of the study

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.

Findings of the study

1. The mean achievement score of the teachers on pre-test is 20.329 and that of post-test is 37.808. The t-value was 12.32 and was found to be significant at 0.05 level. This indicates that the intervention program was effective for elements of reasoning and standards of thinking (analysis of article)
2. The mean achievement score of the student teachers on pre-test for 'Purpose' is 3.0625 and that of post-test is 4.76. The t-value was 6.160 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Purpose' of Critical Thinking
3. The mean achievement score of the student teachers on pre-test for 'Questions' is 2.364 and that of post-test is 4.45. The t-value was 6.70 and was found to be significant at 0.05 level. This indicates that the

intervention program was effective on the aspect of 'Questions' of Critical Thinking

4. The mean achievement score of the student teachers on pre-test for 'Information' is 2.3229 and that of post-test is 5.166. The t-value was 8.83 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Information' of Critical Thinking
5. The mean achievement score of the student teachers on pre-test for 'Inference' is 2.937 and that of post-test is 4.791. The t-value was 4.28 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Inference' of Critical Thinking
6. The mean achievement score of the student teachers on pre-test for 'Concepts and Ideas' is 1.51 and that of post-test is 3.791. The t-value was 5.614 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Concepts and Ideas' of Critical Thinking
7. The mean achievement score of the student teachers on pre-test for 'Assumptions' is 1.531 and that of post-test is 4.041. The t-value was 6.398 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Assumptions' of Critical Thinking
8. The mean achievement score of the student teachers on pre-test for 'Implications' is 1.343 and that of post-test is 3.89. The t-value was 5.45 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Implications' of Critical Thinking
9. The mean achievement score of the student teachers on pre-test for 'Point of View' is 0.822 and that of post-test is 2.302. The t-value was 2.58 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Point of View' of Critical Thinking
10. The mean achievement score of the student teachers on pre-test for Intellectual Traits of mind is 42.159 and that of post-test is 67.92.

Thus, there is a difference of 25.77 that is in favour of post-test. The t-value was 6.36 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Traits' of Critical Thinking

11. The mean achievement score of the student teachers on pre-test for Intellectual Integrity is 4.29 and that of post-test is 5.30. The t-value was 2.23 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Integrity' (Q.1) of Critical Thinking
12. The mean achievement score of the student teachers on pre-test for Intellectual Humility 4.26 and that of post-test is 6.95. The t-value was 6.826 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Humility' of Critical Thinking
13. The mean achievement score of the student teachers on pre-test for 'Confidence in Reasoning' is 4.26 and that of post-test is 5.0.. The t-value was 4.095 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Confidence in Reason' Q.3 of Critical Thinking
14. The mean achievement score of the student teachers on pre-test for 'Confidence in Reason' is 4.07 and that of post-test is 3. The t-value was 1.312 and was not found to be significant at 0.05 level. This indicates that the intervention program was not effective on the aspect of 'Confidence in Reason' Q.4 of Critical Thinking
15. The mean achievement score of the student teachers on pre-test for 'Intellectual Integrity' is 3.61 and that of post-test is 3.14. The t-value was -1.06617 and was not found to be significant at 0.05 level. This indicates that the intervention program was not effective on the aspect of 'Intellectual Integrity' Q.5 of Critical Thinking
16. The mean achievement score of the student teachers on pre-test for 'Intellectual Integrity' is 2.88 and that of post-test is 4.69. The t-value was 2.794 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Integrity' Q.6 of Critical Thinking

17. The mean achievement score of the student teachers on pre-test for 'Intellectual Empathy' is 2.88 and that of post-test is 6.98. The t-value was 5.95 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Empathy'

Q.7 of Critical Thinking

18. The mean achievement score of the student teachers on pre-test for 'Intellectual Empathy' is 4.13 and that of post-test is 5.71. The t-value was 3.76 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Empathy'

Q.8 of Critical Thinking

19. The mean achievement score of the student teachers on pre-test for 'Intellectual Perseverance' is 2.625 and that of post-test is 6.68. The t-value was 7.56 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Perseverance'

20. The mean achievement score of the student teachers on pre-test for 'Intellectual Perseverance' is 2.76 and that of post-test is 4.43. Thus, there is a difference of 1.67 that is in favour of post-test. The t-value was 2.636 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Intellectual Perseverance'

21. The mean achievement score of the student teachers on pre-test for 'Socio- centrism' is 2.42 and that of post-test is 7.07. The t-value was 11.95 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Socio- centrism'

22. The mean achievement score of the student teachers on pre-test for 'Egocentrism' is 2.677 and that of post-test is 5.77. The t-value was 6.997 and was found to be significant at 0.05 level. This indicates that

the intervention program was effective on the aspect of 'Egocentrism'
Q.12of Critical Thinking

23. The mean achievement score of the student teachers on pre-test for 'Integrated Situation' is 1.19 and that of post-test is 3.04. The t-value was 3.865 and was found to be significant at 0.05 level. This indicates that the intervention program was effective on the aspect of 'Integrated Situation' Q.13of Critical Thinking

Findings based on case study/ broad themes emerging from the case profiles

1. Understanding other's point of view in various domains like personal domain, professional domain and subject domain. (The point in the intervention program where it was discussed-standards of thinking-breadth, elements of reasoning-point of view and intellectual traits of mind-intellectual empathy-
2. strategy- understanding that you had a disagreement with someone, chalk down your point of view and others point of view and seek consolidation for the same, making a concept map for the academic concepts and explicitly seeking breadth and point of view- two application entries-personal and academic for each).
3. Dealing with anger, fear and negative emotions by deeply understanding feelings for others, by using logic cycles and using the triad of thinking, feeling and wanting. (point in the intervention program where it was discussed-Triad of thinking, feeling and wanting as well and elements of reasoning-strategy is frame logic of fear, anger, love and subject)
4. Dealing with integration classes with the help of collecting in-depth information, asking questions and creating logic for the topic of presentation in the integration class. (Point in the intervention where it was discussed- standards of thinking-micro assignments on standards of thinking- 2 application entries-)
5. Questioning beliefs, authorities and classmates generalization about particular class of people by clarifying and persevering with questions.

- (Point in Intervention program where it was discussed-intellectual traits of mind- confidence in reasoning and intellectual courage-strategy-think on: have you defended a view in which you did not have enough data. What data would you have collected for defending it?)
6. Understanding superficial knowledge of oneself in subject and recognize faulty concepts to research out, identifying arrogance in work and towards subject and researching out in depth. (point in the intervention program where it was discussed-intellectual traits of mind-intellectual humility- Strategy-intellectual humility-make list of things you know, list of things you don't know and improvements done in what you don't know)
 7. Conducting assemblies in the classes with ease in handling stage fear by understanding each words meaning to speak in English and reasoning with the students to coordinate and work in team. (point in intervention program where it was discussed-triad of thinking, feeling and wanting-two application entries- logic of fear-draft the logic of fear-2 application entries)
 8. Understanding group thinking and how it works on others by expressing one's views in the group and getting aware where it works and reflecting on whether the thoughts are influenced by group thinking.(Point in the intervention where it was discussed-socio-centrism).
 9. Developing Cordial relationships by monitoring anger, improving oneself, integrity in thoughts and reducing egocentric tendencies. (mother, friend, husband, peers, neighbours-Point in the intervention program where it was discussed- three kinds of thinkers- two application of entries of fair-minded Fran).
 10. Being fair by explaining and reminding one's mind of Integrity, being impartial, staying calm, listening to others problems and directing mind. (Point in the intervention where it was discussed-overall concept of critical thinking is being fair-minded).
 11. Reflecting on incidents such as egocentric tendencies within oneself and mind along with reminding of being thoughtful because of Critical

- Thinking. (Point in the intervention where it was discussed-intellectual journal that allows for reflections).
12. Taking rational decisions rather than emotional decisions by working on thinking process (Point in the intervention where it was discussed-reasoning- inference correction tool).
 13. Independent thinking through issues while considering others point of view using standard of thinking of 'Relevancy' and critically examining it such as academic presentations. (Point in the intervention where it was discussed- intellectual traits of mind-thinking independently and intellectual autonomy)
 14. Continuing the B.Ed program by using the Triad of Thinking, Feeling and Wanting, reflection and inner conscience. (Point in the intervention where it was discussed-intellectual traits of mind-intellectual perseverance)
 15. Understanding that thinking can be biased and has to be reflected upon by using elements of reasoning and standards of thinking and not making unreasonable assumptions.(Point in the intervention where it was discussed- lecture)
 16. Efficiently conducting the tasks by using all sources of information of a topic for presentation and using trait of Intellectual Perseverance. Also thinking consciously on doing tasks.
 17. Thinking before reacting by coming forward and tackling situation rather than aggressively looking at the situation. (Point in the intervention where it was discussed- assess reasoning, analyze reasoning and improve)
 18. Making relevant academic presentations and class projects by breaking the content into parts of reasoning and standards of thinking (Point in the intervention where it was discussed-standards of thinking, elements of reasoning-usage of logic-strategy-draft logic).
 19. Understanding egocentric tendencies of oneself, others and being open- minded (Point in the intervention where it was discussed-barrier to Critical Thinking)

20. Understand different cultures because of collection of information on various cultures.(Point in the intervention where it was discussed-intellectual traits of mind-intellectual courage- two application entries)
21. Reflecting in a logical way by considering opinion and connecting information logically to the topic. This helps students to connect with the topic. (Point in the intervention where it was discussed-elements of reasoning-logic).
22. Organization and direction of thoughts by using structure of reasoning. (Point in the intervention where it was discussed-structure of thinking-all assignments).
23. Handling introvert behavior by asking questions and seeking relevancy of others opinion. This helped training of mind.(Point in the intervention where it was discussed-triad of thinking, feeling and wanting-post three entries where you are changing the first aspect of thinking so that you can change the way you feel and want).
24. Helped in communication and independently expressing views in the assembly group.(Point in the intervention where it was discussed-intellectual traits of mind-intellectual autonomy-overall writing skills and oral skills development through journal writing, standards of thinking-clarity and discussing issues in the class)
25. Realization of mistake by thinking on the incident and improving it (Point in the intervention where it was discussed-elements of reasoning-logic cycle).
26. Confronting people and standing for right things(Point in the intervention where it was discussed-intellectual traits of mind-intellectual integrity- strategy-Michael lynch article on intellectual integrity- elaborate on the four pointers on which intellectual integrity is defined).
27. Being impartial and resolving disputes by listening to others(Point in the intervention where it was discussed three kinds of thinkers-application entries of fair-minded Fran)
28. Knowing unknown parts of peers thinking by consciously trying to know what others are saying. (Point in the intervention where it was discussed-intellectual traits of mind-intellectual humility)

29. Meeting deadlines and submit assignments on time by not allowing mind to trick.
30. Disengagement from fights that will not help by repairing ego and avoiding irrational thoughts.
31. Dealing with language barrier by constantly practicing and understanding what others speak.(Point in the intervention where it was discussed- intervention program-intellectual traits of mind-intellectual perseverance).
32. Not allowing to take advantage of oneself by understanding by reflecting on the how advantage was taken. (Point in the intervention where it was discussed-intervention program-intellectual integrity)
33. Understanding that thinking is momentous and affects walks of life by realizing through Critical thinking classes.(Point in the intervention where it was discussed-lecture)

Finding from the focus group discussion

1. We know the purpose, we achieve depth by knowing the purpose of what we do.
2. Alignment and organization of thoughts.
3. Intellectual perseverance and reasoning.
4. Patience has developed.
5. We have started to think.
6. We have stopped overgeneralizing (an aspect of egocentrism)
7. Sometimes we have failed because of Critical Thinking- Barrier to Critical Thinking.
8. My thought process has become broader.
9. Diary work has helped in reflecting.
10. The way it has been taught (through situations, real life examples and discussions) has helped.

Findings from student's perception/descriptive feedback from the students regarding the intervention program and Critical Thinking

1. The student teachers were able to reflect on their thinking process.

2. They were able to start to think, this process had started consciously, they had come across tools that can be used to apply in real life, and they were able to take stand now.
3. Student teachers got an awareness of the tendencies of egocentrism and were able to handle situations in the class.
4. The student teachers further mentioned that they were able to think through the issues explicitly, they were able to stop before reacting, were able to think about oneself, were able to stand for their own rights, it had changed the way they think.
5. Furthermore, the structure of thinking and reasoned thinking, helped to enhance academic performance.
6. Structure of thinking helped to organize thoughts, journal entries helped to reflect, examine situations that went unnoticed, lots of examples were given in the class.
7. The content and methodology and activities with the mentor's attention were significant. The examples of naïve, selfish and fair-minded thinker gave a direction of not becoming naïve/selfish.
8. The in depth explanation along with lot of examples, journal entries, teaching methodology, logical explanations, concepts that were taken in depth as well as breadth made sure that the concepts taught can never be forgotten.
9. The concept mapping also proved helpful to understand the concepts of Critical Thinking.

The aspects of the intervention program that can be improved upon:

1. Critical Thinking can be a part of curriculum, so that the concepts can be taken at length and the time allotted to the course can be increased to one year. This will help in establishing further clarity into the content and its instruction.
2. Language of Critical Thinking can be easier.
3. Disposition aspect of Critical Thinking can be considered in the critical thinking program.

4. There can be more stress on real life application, more examples of the concepts can be added, some more practical classes can be added and viva can be considered as one assessment tool to assess the impact of the intervention program.
5. More practice can be considered for Intellectual Traits of Mind.
6. Consideration of the idea that Critical Thinking needs lot of disposition while applying in each situation.
7. Writing and application of Journal Entries takes a lot of time.
8. The idea that applying Critical Thinking in each situation is difficult can be thought about.
9. Complexities associated with the concepts can be simplified further

6.2 Discussion on the specific objectives of the study.

The first objective of the study was:

- 1. To develop an intervention program of Critical Thinking for the student teachers of Vadodara.**

The research study began with the thought that it is very important from the point of view of the researcher to get equipped with Critical Thinking skills herself, then only the accurate transaction of Critical Thinking is possible to the student teachers. With this purpose in mind the researcher went ahead with browsing of Critical Thinking training programs available for training herself. While browsing through various Critical Thinking training programs the researcher came across the training program offered by Critical Thinking Community. This community is established by Late Dr. Richard Paul, Linda Elder and others who are contributing to this community. The comprehensive aspects (Kuhn, 1992; Kurfiss, 1988; Marzano et al., 1988; Quellmalz, 1987; Weinstein, 1995 as cited in Alemu, 2016) of Critical Thinking that involved reasoning (cognitive) as well as intellectual traits (philosophical) made a significant impact on the researcher and motivated her to take the training program. After going through the comprehensive training of three credits i.e. 45 hours of session along with pre-test, assignments to be submitted weekly, skype interactive sessions, peer and faculty feedback, reading materials, video sessions from Late Dr. Richard Paul and finally a post test, the researcher felt the need

to implement the same on the student teachers. The reviews also established the need for the skills in student teachers. Furthermore, the need as emphasized by various policies and documents like NCF, 2005, NCFTE, NCTE provided further impetus to implement the same. The researcher before implementing the same had to make an intervention that would work in Indian Context that involved examples from Indian Context and Culture. The researcher faced certain difficulties as the approach involved many elements of Critical Thinking. The researcher also found it difficult to incorporate comprehensive elements into Critical Thinking which usually is operationalized to five to six elements majorly involving argumentation, evaluation, fallacy etc. Incorporating the twenty six elements and right kind of examples with right pedagogy was a task to be successfully handled. The researcher referred to NCTE document that discussed various approaches that would work right for inculcating Critical Thinking that is considered as value based skill in Indian Scenario. After referring to the review of related literature and discussing the intervention program with guide it was designed and given to five-six experts to evaluate it. One more challenge that the researcher faced was with the evaluation component of Critical Thinking. The evaluation aspect is not available easily and if it is available it is expensive. So then the researcher gave it a thought, talked with the review committee, external guide and decided that even Richard Paul's approach used a standardized test to evaluate the skill. That is the reason same standardized test was taken up to evaluate the Critical Thinking component.

After the evaluation component with reference to standardized test was resolved it was observed and noticed that this test incorporates elements of reasoning and standards of Critical Thinking. So it was thought and discussed with the committee to evaluate the intellectual traits of mind. But the challenge lied in again evaluating them.

Again upon discussion with the guide and expert, a situation test was designed to assess it. Two situations for one trait approximately were designed. Also one integrated situation involving more than one trait was considered to check whether student teachers were able to analyze the situation that involves more than single trait. One of the expert who validated the tool shared a feedback that the questions for the situation can incorporate blooms taxonomy which then was corrected and modified.

The tool was then validated by the experts. This program in the form of pilot study was implemented on 2016-18 batch to observe the impact it makes and to check its preliminary effectiveness. This helped the researcher to finalize the program. A descriptive opinion helped to understand how the program was helping the students and what kind of teaching techniques would help the students to understand the dimensions of Critical Thinking clearly. The opinions with respect to discussions in the class along with the written feedback and the difficulty to understand the conceptual part of the Critical Thinking dimensions were strictly incorporated. The final intervention program after validation from the experts was implemented on 2017-19 batch.

2. To implement the developed program of Critical Thinking on the student teachers of Vadodara.

The developed intervention program based on Paul's Approach to Critical Thinking was implemented on the student teachers of Vadodara i.e. the sample constituted of student teachers of Navrachana University. Some thought process went behind selecting the university as the sampling frame. First, since the researcher is part of the university as a faculty teaching the Bachelor of Education and also a research scholar from the same; the student teachers of B.Ed. program of Navrachana University were selected as sampling unit. Second the practical difficulty associated with implementing the program of 50 hours and extending to two different semesters and some classes on the weekends.

The course was taken up as a part of Tools for professional development course. The batch on which it was implemented was of the academic year 2017-19. The program was implemented for a period of one complete semester. Further, some portions were also taken up in the second semester. This implemented program involved writing journal entries in the Intellectual Journal and also assignments that involved routine application of concepts. The real life application was taken care in the form of journal entries that also involved taking students continuous feedback to improve the intervention program. This data was used for qualitative research in the form of case studies of student teachers and for further student mapping. The students kept on opining that lecture sessions were more interesting for them to understand the various dimensions of Critical Thinking. The sessions were modified accordingly. It

was observed that each batch then had a peculiar way of absorbing the content rather than the pedagogy to understanding Critical Thinking, as the earlier batch opined to more activities that can be incorporated.

These students had become so enthusiastic while implementing the program that they continuously came for the queries from their personal life as well as academic life. The students got involved with the researcher for getting to know more of Critical Thinking and its dimensions. They also honestly talked about the group dynamics in action in the classroom as well as very significant issues like copying in examination. The classes were given the first slot in the morning that gave it the first aspect that can be absorbed with a fresh mind. It was observed that the students would find it difficult to absorb contents of the theory as well as to think in any other slots of the classes. The students also came on to discuss the application aspect of Critical Thinking while they went into their internship training phase.

These student teachers found that teaching with teachers' own real life examples and connecting to the situations that exist in the outside world was best absorbed and well understood. They found themselves becoming open minded (Arockiasamy, 2014) with respect to the feedback given in the integration and simulation classes. These student teachers also became very well aware of the fact that they had superficial understanding of the content. There were many students who came and requested to continue with Critical Thinking course in the second semester. This course in terms of intervention program was welcomed by most of the student teachers.

3. To study the effectiveness of the implemented program on the student teachers of Vadodara.

To study the effectiveness of the implemented program two tests were designed to see how the student teachers performed on the Analysis of the article test as well as Situation test. It was also decided by the committee that the qualitative data in terms of Case studies, Focus group discussion, Students mapping and Descriptive feedback/students perception can be considered to triangulate. To check the significance in the difference in the mean scores, t-test for dependent means was applied. The t-test proved that the results were significant. The significant outcome

can be attributed to the intervention program as there was no other way to completely understand the standards of thinking, elements of reasoning and Intellectual Traits by oneself.

The student teachers were asked to do assignments for the application of the same. The assignments were 1) Work out with your thinking 2) What do you understand by the word Critical Thinking till now and note the difference as in what did you think about it and what is it actually 3) Briefly summarize the meaning of standards of thinking along with logic 4) construct the logic of anger or logic of love 5) Construct parallel statements as given in the paragraph 6) Construct the logic of the course 7) Construct the logic of textbook 8) During a disagreement with someone construct your point of view and construct others point of view and provide with overview of the situation and reflection. 9) Think of a situation in which your behaviour was not according to what you say or believe. Situation in which you thought you lacked intellectual integrity.

They could apply the same understanding of these in the post test explicitly because students were asked to compile assignments that asked them to apply the traits of fair-minded Fran in real life, also the student teachers were asked to apply standards of thinking and elements of reasoning in academic context and the entries revealed that the practical classes that is integration and simulation classes improved because of the application of the same.

These assignments were further discussed in the groups of two in which each one had to explain the logic of the subject to another and point out the questions which were not understood by other. The questions were supposed to be answered by the student teachers explicitly. The student teachers found this task really challenging as they had never thought of thinking about purpose of the respective subject. Few students from master's background also asked the researcher,

“Madam it's amazing that we haven't thought about these reasoning elements in spite of having post-graduation into the same. I am feeling so surprised that I don't know the purpose of my own subject that I studied till masters”,

The student teachers felt frustrated but also encountered new dimensions into their subject. They felt this assignment to be challenging and so the researcher asked them to consult their respective method masters to seek clarity into the same. This helped the student teachers to use the model in their respective academic contents.

Few students felt this assignment so very interesting and contributory to their academic growth that in their internship phase they implemented this on their students and incorporated this into their action research assignments.

Some student teachers found the concepts bit difficult to understand and grasp and wanted to have the revision of the same again and again. After continuous attention to them and repeating the concepts slowly again into the classes helped the students to moderately achieve the goal of using the logic into their subject as well the approach into the classes. Moving ahead the student teachers got used to this rigorous way of thinking and asked whether the same course can be continued in the next semester.

The student teachers overall performance in the test for the scores was significant but independently they could not achieve significant scores for standard of reasoning in terms of Clarity, Accuracy, Relevancy and Precision in the test of analysis of article probably because it was only of five marks and could not generate the t-test results. The student teachers had begun to use standards of thinking in their classes for the purpose of feedback in integration and simulation classes as well as with reference to the presentations in regular classes. The student teachers already had used standards of thinking in integration classes to achieve clarity and depth in the classes. Many of the student teachers journal entries mention the use of the standards of thinking in the classes they practiced.

The overall scores of situation test

The situation test had in all thirteen questions. Each trait was assessed on an average with two situations each. In one case there were three situations for one trait. The last situation asked students to think about more than one trait. It was found that the mean scores of the post tests were high. In order to check whether the mean scores were significant or not, t-test was applied. The t-test found that the results were

significant (6.36). Thus the intervention was successful in achieving the same. When the t-test was applied to one situation at a time it was found that results were not significant in case of situation five and six, i.e. intellectual integrity and confidence in reason.

In all other questions involving different traits the t-test found significant results. The trait that majority of the students answered to the best was socio-centrism (28.57%). It can be attributed to number of variables that may have contributed to understand or answer this situation in a better way. One variable could have been that these student teachers had done a mass bunk. This mass bunk example was a part of situation test. This mass bunk situation was similar to group thinking that made the students to bunk the class. The student teachers could relate with socio-centrism very well because this situation exactly depicted the barrier in action (when they did mass bunk) that is a part of Critical Thinking. This can further point out the fact that experiences that they gain from experiencing in real life or activity can bring closer association with the content.

Only 1.78% of the students performed well on the integrated situation. That is the least performance was seen in the integrated situation. This can be due to the fact that the situation involved more than one trait and student teachers were not able to recognize multiple traits in one situation. They were much able in the situation which involved one trait to be answered. The concepts of intellectual traits required them to clearly understand the theoretical background behind them so that could have been a reason that understanding of all traits in one situation could have been little tricky to apply.

Profile studies

Profile studies came out with the broad inferences/ themes about the areas in which the Critical Thinking dimension was accurately applied. The areas are handling stage fear, thinking about one's own thinking, being open-minded, helping to cope up with the idea of quitting the program, reflecting on situations, helping in reducing egocentric tendencies, standing for right things, handling anger, organization of thoughts, dealing with depth of the subject while taking up classes in integration, questioning beliefs, taking up assemblies confidently and more.

These reflections were possible because every week the students were required to apply what they understood in the Critical Thinking course in their academic life and personal life. The application asked them to reflect on various aspects that they were required to deal with. Further, findings from Morerya (1991) suggest that Critical Thinking helps to understand mental constructs in a better way. Further, the findings also suggest that usage of Paul's Model helps in developing Critical Reflection. The study conducted by researcher also comes out with the same finding that it helps in handling stage fear and anger. It also helps to reflect on how one thinks. Dewey (1933) suggests that reflective thinking is an active, persistent, and careful consideration of a belief or supposed form of knowledge, of the grounds that support that knowledge, and the further conclusions to which that knowledge leads.

Student teachers also said that they had consciously reflected by going back on situations that happened in the day; also to check where they applied it. Now, I would like to discuss the broad themes that have emerged from the profile studies

- Handling stage fear: Handling fear through logic cycles (logic of anger, fear and love) was one assignment of that may have helped the students to deal with this fear as well as anger. While framing the logic, the student teachers were able to reflect on the purpose of fear, love and anger. So then they were able to think and handle it consciously. This finding supports finding from the studies conducted by Tyagi (2017) that Critical Thinking helps students regulate emotions like anger, stress, fear, shame, sadness and guilt.
- Thinking about one's own thinking is another broad theme that emerged out of the case. Metacognition, as it is rightly said is the core philosophy behind Paul's model to Critical Thinking. This finding of the researcher is also supported by finding from Tyagi (2017) that Critical Thinking helps in metacognition. Also according to Flavell, metacognition is a subset of Critical Thinking. It begins with the thought that 'everyone thinks about changing others but no one thinks about changing oneself'. The idea behind this was carefully considered in the meaning of Critical Thinking and reinforced in the class as well queries that came up in the classes.

- Continuously strive behind tasks and assignments as well as not quitting that was started initially for that year was one key aspect considered in intellectual perseverance. Further this idea was continuously reinforced in method classes to take up things at depth and to achieve depth perseverance is required. Students were seen to reflect on their presentations and depth that was required to execute the content. In a way perseverance was developed.
- Organization of thoughts is a by-product in Critical Thinking. Thoughts are organized, once reflection happens about thinking about one's own thinking is considered. It also proved to be helpful in dealing with their academic presentations and many groups considered voluntarily using logic in presentations. This logic is system of ideas that work together. Logic helps to organize thoughts because these thoughts will also be required to work in systems. This voluntary usage gives an idea of the significant impact of logic in the content.
- According to National Council of Educational Research and Training, our beliefs, values, and social practices influence the way we think. The student teachers also started to question beliefs like wearing bangles in particular situation for a married woman, not going to temples in certain cases and situations, regarding rituals etc. This clearly gives an indication that Critical Thinking abilities were developed because student teachers were questioning the practices of the society. This finding is supported by the finding of Buranpatana (2006) that shares the finding that Critical Thinking helps to question in classrooms.
- The case studies emerged with certain barriers that the student teachers felt to the Critical Thinking process like time constraint; the classes were given an hour and may be that time wasn't enough to get student teachers into a very intense thinking process. Because thinking requires time and some warm up to think with. While the student teachers were getting used to the thinking process and were able to reflect somewhere the thinking classes got over in the semester. They could realize the actual essence of Critical Thinking and started to basically like it by the end of the semester. If the time allotted could be distributed over a complete year then it would have

been better. And also the barrier to Critical Thinking is being emotional and emotions might have been overpowering. As per Paul and Elder, emotions and feelings act as a barrier in the decision making process. Thinking clearly requires time and can be developed over a period of time

- Another impediment they faced is intellectual laziness. It's basically giving up easily on the tasks that require intellectual perseverance. According to Richard Paul intellectually lazy person cut himself from getting depth into the tasks.
- In similar ways practice with people who are in power and hold authority, practice with people who are unreflective thinkers, group thinking, not being able to communicate accurately and clearly, lack of experience and knowledge in Critical Thinking, failing to control biases and ending in faulty thoughts are found to be the barriers to Critical Thinking.

Focus group discussion

1. Critical Thinking has helped the student teacher to seek purpose in what they do. Seeking of purpose has helped them to understand assignments in a better way. This way they are able to achieve clarity into doing what they do. This can be specifically attributed to the aspect of 'Purpose' of Critical Thinking that was taken explicitly in the class. This could be because the student teachers were also provided with assignment that asked them to think and write about the purpose of subject they taught. Further they were also asked to write about the purpose of the textbook also. In this way this consciously helped the student teachers to think about the purpose of what they did. This further helped to achieve clarity. Seeking purpose also helped to raise essential questions.
2. It helped them to align their thought process; that is organization of thoughts.

According to Halpern, if thinking is effortful and conscious it means it's not automatic and non-directed. It's directed towards something because it's consciously done. The student teachers were consciously thinking about thinking and that helped them to organize the thoughts. They had understood

now standards of thinking and elements of reasoning. Student teachers were seen to get frustrated to write the entries since they thought difficult to reflect. But after some entries they could start reflecting, frustration went down and they could organize their thought process.

3. They have started to reason and reason with lot of perseverance. Purpose helped the student teachers to ask questions and questions helped to understand things that were complex. There was a student teacher who did not quit the program (one of the student in the case study) because of the trait discussed in the class of intellectual perseverance. They started to think with patience and interest. They also thought about relevancy of things. They could also understand problems in their thinking process. They were able to understand where they lack. They were also able to understand how things are to be done. Academic presentation and integrating logic helped them to reason logically.
4. Their thought process has changed in terms of overgeneralization of any aspect. This can be attributed to the overgeneralization concept discussed in egocentric class. This class was also taken up in a constructivist way. This is where the situation was given and students were asked to analyze it. Since the class was taken in an activity form the student teachers attached meaning to it quickly and remembered it for a long time.
5. Their thinking is happening in situations. As per National Council of Educational Research and Training, Thinking is an internal mental process, which can be inferred from overt behaviour. This overt behaviour of the student teachers is seen when they speak right things in front of people who are more knowledgeable. Earlier they used to accept things that are spoken by people who are more knowledgeable (an aspect of confidence in reason). But now, it's not so, they are able to counter. Earlier, the thought process was narrow because it did not allow them to counter a person who had more knowledge on something. The thought process has become broader.
6. There is also a barrier associated with Critical Thinking. Some people have left them just because they applied Critical Thinking (what aspect of CT is unknown). Sometimes they thought that they lost self-respect because they

tried hard to understand others point of view but others did not. They noticed a problem in Critical Thinking when they applied but others did not. They kept questioning this aspect saying that “madam we will apply point of view and other aspects of Critical Thinking but what if others don’t and take our advantage? to which the answer was, “ you think about your thinking and don’t try to change others thinking but help them to reflect by asking questions”.

7. The thinking and writing about application of aspects taken in the classes has helped them in reflecting about their thinking process. Earlier the entries were made for the sake of it but after some time it helped them to understand and reflect on things. These reflections also helped them to achieve depth.
8. The way it was taught helped them to connect to it. The content was explained with lots of real life examples of the teacher. It was also understood through discussions and situations. This helped them to relate to it and thus bring interest into it.
9. After the space of around two months now they have actually got time and space to reflect about it. So now it has started to sink into their minds.

Descriptive feedback

The students teachers were able to reflect on their thinking process, they were able to start to think, this process had started consciously, they had come across tools that can be used to apply in real life, they were able to take stand now, they got an awareness of the tendencies of egocentrism and were able to handle situations in the class. Reflections somewhere were part of their regular Intellectual Journal entries that were supposed to be posted after every significant topic covered. According to Halpern, by understanding how and when we are irrational, we can make better decisions, and by extension, we become better thinkers. Thus understanding of where they were irrational or egocentric by way of reflecting helped the student teachers to think critically through the situation and make better decisions.

Many a time’s student teachers mentioned the fact that they had to go behind and really think about where they have consciously applied the particular aspect of thinking. Also the student teachers mentioned that they while in conversations or

taking decisions used to remember the topic covered in the class and consciously apply it. This helped in reflecting. They also started to reflect on situations that went unnoticed in the day. Further, they also mentioned that they never knew how to think but now they have the tools to guide them in thinking. These tools of thinking helped them to organize the thought process and make them reasoned thinkers. These student teachers had now tool by which they could accept or reject a quality of thought. The examples of naïve, selfish and fair-minded thinker gave a direction of not becoming naïve/selfish.

Furthermore the intellectual traits of intellectual autonomy helped the student teachers to take decisions in this phase independently and the barrier helped to understand the egocentric tendencies. This all helped to enhance academic performance. These student teachers used the structure of thinking in their presentations in other classes as well. The logic that was incorporated in the presentation helped the student teachers to organize and classify content based on parts like purpose, questions, information, and inference and so on.

These student teachers had a drive towards lot of real life examples from the teacher's side. Real life examples and in-depth explanation of the content helped them to stay connected in the classes. The student teachers were really happy about concept mapping done in the class to explain and connect between the content.

The content and methodology and activities with the mentor's attention were significant. The in depth explanation plus lot of examples, journal entries, teaching methodology, logical explanations, concepts that were taken in depth as well as breadth that the concepts taught can never be forgotten.

The aspects of the intervention program that can be improved upon

Critical Thinking can be a part of curriculum- as mentioned earlier as well that student teachers opined that it should be a part of their curriculum. It meant that it should be for the entire year so that the change can be noticed and reinforced. As the student teachers could see that it being part of one semester and then going ahead with just extension of what was left from Critical Thinking did not help much; as they felt

that it's difficult to practice by themselves but if someone takes it every day it will remain with them for a longer time. This also gives another aspect that can improved

i.e. it has to be for more than just five months, language of Critical Thinking can be easier: student teachers were given the concepts and terminologies from the Paul's model and that's where the difficulty aroused as in the concepts like intellectual integrity, intellectual humility, socio-centrism, egocentrism etc. were not only difficult but required continuous referring to the concepts to apply. This repetition of exercise is found to be one of the important element to think critically and gain proficiency in the skill (Dawson, 2000 as cited inMulnix, 2010).This made the student teachers a bit off as it requires philosophical base to understand and remember the concept.

Smith, (2020) in his article 'Eduard Lindeman and the making of adult education has written that Lindeman (1947) has stressed the significance of experience in learning. He has written about engagement in education as being a process of 'utilizing knowledge, feelings and experience in problem-solving' and of making 'increasing use of experience' (p. 53). This is where student teachers felt that improvement is needed wherein they opined that there can be more stress on real life. Practical experiences can be given to the student teachers by which they can attach themselves to the learning process, more examples of the concepts can be added, and viva can be conducted- some student teachers gave an opinion that viva can be conducted to find out the understanding of Critical Thinking which can be considered if it's a long term process.

6.3 Consolidation of the discussion

The study titled 'Developing, Implementing and Assessing and Intervention program to Critical Thinking for student teachers of Vadodara' used mixed method research as the technique to analyze the data. The study also used an intervention program based on the aspects of Critical Thinking to enhance Critical Thinking skills of the student teachers. The study determined its sample as the student teachers and used a descriptive feedback so as to prove the effectiveness of the intervention in the classroom set up. It used 't' test, case studies, focus group discussion and descriptive feedback to analyze the data received. The intervention program achieved the

objective of enhancing Critical Thinking skills of the student teachers of Vadodara. This finding was in conjunction with the studies conducted by Reza, (2017); Sridevi, (2016); VijayLaxmi, (2016); Dheeran, (2016); Sherafat, (2015); Prasad, (2015); Ratheesh, (2014); Kumari (2014); Manjula, (2013);Tawai, (2012); Seeja, (2012); Krishnan, (2011); Patel, (2011); Patel, (2011); Meghani, (1999); Reed, J. (1998).

The finding of Wakaluya (2014) and Gurubassapa (2010) that Critical Thinking enhances academic achievement is supported by the present study. The inference reached by Krishnan (2011) that the strategy of asking questions and reflecting critically on tasks proved to be successful in enhancing Critical Thinking. In congruence to this finding, this study employed these methods for transacting and enhancing Critical Thinking. It was further found in the study that Critical Thinking and Reflective Thinking are interdependent on each other by this study. This study used reflective journals helped to cultivate reflections. Tyagi's (2017) finding that students with the help of metacognition were able to identify strengths and weaknesses of their own thought processes. This study also found that students were able to know the unknown parts of their as well as their peer's thinking process by reflecting on their thought process. Prasad (2015) suggestion of thinking aloud, regulation of cognition and self-reflection as important competencies to be developed by the students is also supported by the present study. Also, Ratheesh (2014) study found that reflection helps develop clarity. This study found that clarity developed because of explicit integration of Critical Thinking in the curriculum. Also, the component of Reflection may be involved in developing clarity as that is one theme emerging from this study. Though it may not be overtly cited that reflection developed clarity.

Thus, this study that used Paul's approach to Critical Thinking employed 50 hours of training into the program. It required the students to write intellectual journals and also used assignments to further strengthen the work. This task is quite cumbersome and needs time. The explicit integration of strategies into the content is important construct of the intervention program. These strategies can be used by the student teachers to enhance the Critical Thinking component of the students in the schools that they get associated with.

Comprehensively this intervention program came out with rich theoretical and application based understanding of Critical Thinking for the student teachers of Vadodara.

6.4 Implications for further research

The study was conducted in a regular natural setting of the university. The heavy schedule of the faculty, the regular classes of the student teachers, student teachers continuous involvement in other aspects of the university; like the republic day function, teachers day event etc. was something that was common and was undertaken in such dynamic environment of the university. In spite of the challenges in the regular working of the university schedule student teachers achievement scores and qualitative analysis reveal significant improvement in scores as well as improvement in aspects of Critical Thinking as highlighted above. These results indicate that Paulian approach was effective to train student teachers in improving Critical Thinking abilities in Indian Context. It has improved the abilities on broad range of aspects of Critical Thinking like purpose, organized thinking, concepts and ideas, implications and barriers like socio centrism and egocentrism. This has been effective for student teachers and can be now applied to other disciplines like science, arts, engineering, and commerce. Also, if the students are to be trained then it requires the faculty to be trained. Thus, it can also be reached to faculty of various programs. The reviews reveal that very few teachers and faculty are trained in teaching for Critical Thinking and unless and until explicit training is provided it can't work effectively. One can't know standards of thinking, reasoning and intellectual traits by oneself. Also it requires training into usage of the model because it's very substantial.

Also reviews and study proves that Critical Thinking will not work effectively in an episodic way or just by doing it once or twice or by planning few lessons that integrate thinking element without conscious notice of the students. It's a continuous, explicit, conscious and long term process so the training program on Paul's Approach to Critical Thinking should be such that it is explicit, conscious and part of the curriculum. It was also found in the study that it will not make much impact or student teachers need more training in the model that is, more time is invested into training so that it doesn't fade away easily. Thus it should be a yearlong process and a part of curriculum. Further, the need then arises to train various departments and

faculty of the universities to train them into teaching Critical Thinking. The reviews also state that it is need of the hour and many educational documents emphasize its urgency, so it can be now taken up into schools, universities and the community in general.

This study also reveals that this is a substantive model and is very comprehensive into its concept and frustration is natural. So it requires efforts from all and throughout the year. Education can take Critical Thinking as a principal task in education; be it school or university. It also requires reflective and questioning methods to oneself as a quality in a person so that it can be taken with rigor and with intensity. The methodology taken up for assessing Critical Thinking also proves to be useful as it involved all aspects of Critical Thinking and also the profile studies, the focus group discussion, students mapping and descriptive feedback helps to know the movement of the thought process. So Paul's model to Critical Thinking has enhanced Critical Thinking abilities in Indian context, the change in the level of Critical Thinking is significant and also the design and package used for improving Critical Thinking is effective.