

**DEVELOPING, IMPLEMENTING AND ASSESSING AN
INTERVENTION PROGRAM BASED ON PAULIAN
APPROACH TO CRITICAL THINKING FOR
STUDENT TEACHERS
OF VADODARA**

A

Thesis submitted to

Navrachana University

For the Degree of

DOCTOR OF PHILOSOPHY

In

Education

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MAY, 2021

CHAPTER 7

SUMMARY

7.1 Introduction

It is an organized fact that Critical Thinking is an important concept in education (Lipman, 2003; Freire, 1970; 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 skills by using the words empowerment, self-reflection and critical pedagogy.

This fact has also been emphasized by various documents, policies and frameworks in India as well as globally. Recent Draft of National Policy on Education, 2019 also emphasises the fact of reducing the curriculum content so that Critical Thinking can be envisioned in school education. NCERT 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. NCF, 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 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 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 has been highlighted by many authors, philosophers and thinkers like John Dewey,

Edward Glaser, and Edward Debono. A stark contrast is observed when education is promoting rote memory, factual knowledge, textbook culture (NCF, 2005 p13) against building decision making and judgment capacities (Meghani, 1999).

Newest field of neuroscience that deals with the structure and functioning of the human brain also suggest Critical Thinking as a means of developing the

prefrontal cortex which is responsible for executive functions of decision making and logical thinking.

The above milieu strengthens the fact that curriculum must be integrating Critical Thinking as a component of school education system. Even after highlighting this fact the education has not been able to successfully implement Critical Thinking as it explicitly doesn't deal with the subject. Further, there is very little evidence that points to the fact that other subjects can develop Critical Thinking skills explicitly (National Research Council as cited in Willingham 2007; Jones & Haydon 2012; Massa, 2013). The teachers have to be trained to take Critical Thinking 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).

Thus, this study attempts to make an intervention program that aims at enhancing Critical thinking skill of the student teachers through use of a comprehensive model to Critical Thinking. Various models are into experimentation in this significant area. There is no common consensus to definition of Critical Thinking. 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 to Critical Thinking. John Dewey emphasises on reflective thinking as a key component to suspend judgement. 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 has its own sub-skills. It is important to note that the experts have agreed to the above skill set makes it difficult to apply for everyone (ibid, p.3 as cited in). Lipman emphasises on Judgement, contextual usage of critical thinking and criteria as concepts of Critical Thinking. The 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 emphasises on Cognitive as well as affective dimension to Critical Thinking. He also uses the concepts of weak and strong sense critical thinking along with concept of sophist. In addition to that, he attempts on integrating Critical Thinking into curriculum to get insights in to the subject. This model as suggested earlier deals with philosophical and cognitive dimension of a human.

This makes it comprehensive in its nature.

Thus, this study uses Paul's Model to Critical Thinking to develop the intervention program that can be integrated into the content on a typical class day.

7.2 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'?

5.1 Statement of the Problem

“Developing, Implementing and Assessing an Intervention Program based on Paulian approach to Critical Thinking for Student Teachers of Vadodara.”

5.2 Objectives

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.

7.3 Hypothesis

H1: There will be no significant difference between pre-post test scores of the student teachers in terms of standards of Critical Thinking and elements of reasoning at 0.05 level of significance (standardized test)

H2: There will be no significant difference between pre-post test scores of the student teachers in terms of Purpose, questions, information, concepts and ideas, assumptions, inference, implications, point of view, clarity, accuracy, precision and relevancy at 0.05 level of significance

H3: There will be no significant difference between the pre-post test scores of the student teachers in terms of intellectual traits at 0.05 level of significance (situation test)

H4: There will be no significant difference between the pre-post test scores of the student teachers in terms of intellectual humility, intellectual integrity, intellectual empathy, intellectual perseverance, intellectual courage, confidence in reason and integrated situation at 0.05 level of significance

7.4 Operationalisation of the terms

1. Clarity: free from confusion; elaborate, illustrate and exemplify.
2. Accuracy: free from errors; is the author accurate in what he/she claims?
3. Precision: necessary level of details. Is the author precise in giving necessary details?
4. Relevancy: relating to the matter on hand
5. Purpose: it means aim, objective or function.
6. Questions: question at issue or hand.

7. Information: information is the data or information on hand.
8. Inferences: Inference means conclusion.
9. Concepts and Ideas. Concepts and Ideas means theories, principles and laws.
10. Assumptions: Assumptions are presuppositions that are taken for granted.
11. Implications: Implications are those that we logically follow from inferences
12. Point of view: Point of view is the frame of reference.
13. Intellectual humility: acute awareness of one's own ignorance. Awareness of one's own belief justified by reasoning standards.
14. Intellectual Courage: accepting and understanding others persons point of view, ideas even when it is painful to do so.
15. Intellectual Empathy: put oneself in the place of others on a routine basis.
16. Intellectual Integrity : situation understanding as of practicing what one advocates for others
17. Intellectual Perseverance: to work ones way through intellectual complexities despite frustrations inherent in the task.
18. Confidence in reason : moved by reasoning based on data, facts and proofs
19. Intellectual Autonomy : views are reasonably given by evidence
20. Standards of Thinking: Developing Clarity, Accuracy, Precision and Relevancy.
21. Elements of Reasoning: Developing Reasoning through the elements of Purpose, Questions, Assumption, Information, Concepts and Ideas, Inferences, Assumptions and Implications.
22. Intellectual traits: Developing understanding of intellectual humility, intellectual integrity, intellectual perseverance, intellectual courage, intellectual empathy, confidence in reason, fair-mindedness.
23. Package: a package for enhancing Critical Thinking skills that is based on Paulian Approach to Critical Thinking

In the Present study the assessment of Standards of thinking and Elements of reasoning was done through Analysis of the Article Test. The Intellectual Traits were assessed through situation test.

7.5 Explanation of the terms

1. Critical Thinking skills: refers to the development of skills through various strategies evolved in the package and assessing the skills with parameters of standards of thinking, elements of reasoning and intellectual traits
2. Developing and training the student teachers: development of the package for developing Critical Thinking so that they are trained to use the same in teaching the subject content.
3. Assessing the effectiveness: effectiveness in terms of change in scores of standards, elements and intellectual traits and qualitatively through case studies, journal entries, interviews and descriptive feedback
4. Standards of Critical Thinking: clarity, accuracy, precision, relevancy, significance, depth, breadth and logicalness
5. Elements of reasoning: purpose, questions, information, assumptions, inference, implications, point of view and concepts
6. Critical Thinking skills: refers to the development of skills through various strategies evolved in the package and assessing the skills with parameters of standards of thinking, elements of reasoning and intellectual traits
7. Developing and training the student teachers: development of the package for developing Critical Thinking so that they are trained to use the same in teaching the subject content.
8. Assessing the effectiveness: effectiveness in terms of change in scores of standards, elements and intellectual traits and qualitatively through case studies, journal entries, interviews and descriptive feedback

7.6 Design of the study

7.7 Development of the Intervention Programme

To effectively enhance Critical Thinking skills of student teachers the intervention program consisted of fifty sessions. The duration of each session was for one hour. This intervention program began with a Pre-test and Post-Test of Analysis of Article and Pre-Post Test of Situations. The effect of the intervention program was

seen on the student teachers through Case Studies of selected students, Focus Group Discussion and Descriptive Feedback taken at the end of the intervention program.

7.8 Procedure of the study

7.8.1 Population of the study

Population of the study: The population of this study comprised of all the student teachers of the Bachelors of Education programme of Vadodara City for the academic year 2017-18.te

7.8.2 Sample of the study

Sample: 47 B.Ed. students of Navrachana University will be selected as sample for the study

7.8.3 Sampling Technique

Sampling technique-The Purposive Sampling technique is selected in the present study.

7.9 The process of Data Collection

- Development of Intervention Program
- Validation of the Package
- Administration of Pre-test on Pilot group
- Administration of Post-test on Pilot group
- Feedback on the same of the stakeholders
- Modifications to improvise the Intervention Program
- Actual Implementation of the Intervention Program
- Administration of the Pre-test on the sample
- Administration of the Post-test on the sample
- Data collection from profile studies
- Data collection from focused group discussion

- Data collection from descriptive feedback

7.10 The process of Data Analysis

The data will be collected through the pre and post-test of experimental group and was analyzed quantitatively and qualitatively with further clarifications. The researcher used t-test depending upon the data that was generated quantitatively. The quantitative data from the test scores was used for choosing sample for case study analysis. The qualitative data used the tools of Case study analysis, Focus group discussion and Descriptive Feedback.

7.11 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. 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' Q.9 of Critical Thinking
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' Q.10 of Critical Thinking
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' Q.11 of Critical Thinking
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.12 of 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.13 of 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.
2. 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.
3. 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.
4. Questioning beliefs, authorities and classmates generalization about particular class of people by clarifying and persevering with questions.
5. 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.
6. Conducting assemblies in the classes with ease 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.
7. 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.
8. Developing cordial relationships by monitoring anger, improving oneself, integrity in thoughts and reducing egocentric tendencies.
9. Being fair by explaining and reminding one's mind of Integrity, being impartial, staying calm, listening to others problems and directing mind.
10. Reflecting on incidents such as egocentric tendencies within oneself and mind along with reminding of being thoughtful because of Critical Thinking.
11. Taking rational decisions rather than emotional decisions by working on thinking process.
12. Independent thinking through issues while considering others point of view using standard of thinking of 'Relevancy' and critically examining it such as academic presentations.

13. Continuing the B.Ed program by using the Triad of Thinking, Feeling and Wanting, reflection and inner conscience.
14. 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.
15. 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.
16. Thinking before reacting by coming forward and tackling situation rather than aggressively looking at the situation.
17. Making relevant academic presentations and class projects by breaking the content into parts of reasoning and standards of thinking.
18. Understanding egocentric tendencies of oneself, others and being open-minded.
19. Understand different cultures because of collection of information on various cultures.
20. Reflecting in a logical way by considering opinion and connecting information logically to the topic. This helps students to connect with the topic.
21. Organization and direction of thoughts by using structure of reasoning.
22. Handling introvert behavior by asking questions and seeking relevancy of others opinion. This helped training of mind.
23. Helped in communication and independently expressing views in the assembly group.
24. Realization of mistake by thinking in the incident and improving it.
25. Confronting people and standing for right things.
26. Being impartial and resolving disputes by listening to others
27. Knowing unknown parts of peers thinking by consciously trying to know what others are saying.
28. Meeting deadlines and submit assignments on time by not allowing mind to trick.
29. Disengagement from fights that will not help by repairing ego and avoiding irrational thoughts.

30. Dealing with language barrier by constantly practicing and understanding what others speak.
31. Not allowing to take advantage of oneself by understanding by reflecting on the how advantage was taken.
32. Understanding that thinking is momentous and affects walks of life by realizing through Critical thinking classes.

Finding from the focus group discussion

1. We know the purpose, we achieve depth by knowing the purpose of what we do
2. Alignment of thoughts, 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, 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.

7.12 Conclusion

The Present study puts up the inference that Critical Thinking Intervention Program was effective in enhancing Critical Thinking Skills of Student teachers of Vadodara. Further, it also provided the audience with the various nuances that qualitative data generated. This makes it further important to transact Critical Thinking skills at various levels of education. It can be a part of school education as well as university education. It can be useful in making content stronger by processing it in the accurate manner as well as a tool for personal growth that makes individuals better citizens.