CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS
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5.1 Summary

The goal of helping students to become effective thinkers is fundamental to any educational practice and is certainly not a new idea. John Dewey saw the development of an individual capable of reflective thinking as a prominent educational objective. The National Policy on Education - 1986 subsequently modified in 1992 has justifiably emphasised, "subject should be visualised as the vehicle to train the child to think, analyse, reason and articulate logically". Scholars are of the opinion that thinking is not another educational option. Rather it is an indispensable part of it, because being able to think critically is a necessary condition for being educated, and educationists have come to realise that teaching for developing critical thinking is an essential function of School.

The old way of educating that was passable in a relatively stable world no longer works. Rote memorisation is useless when what is memorised today is obsolete tomorrow. It is certainly easier in the short run, to lecture students and test for their ability to restate the lecture. In the long run, the didactic counterfeit of education leaves our citizens grossly unprepared and unable to assume their responsibilities, now unavoidable to make rational judgement about significant national and global issues.
As we approach the end of the 20th century, drastic social, political, economic and environmental changes around the globe demand citizens be trained to identify and analyse issues and problems not merely memorise facts and follow directions. Social demands for higher order thinking are increasing. There is an emphasis everywhere in the need for a future workforce capable of more sophisticated thinking than was generally required in the past. Such skills as independent analysis, flexible thinking and problem solving are now considered basic requirements for many jobs. In addition, in this information age which is characterised by the rapid expansion of knowledge and the emergence of increasingly sophisticated technologies, the ability to adopt quickly to change, along with the capacity and willingness to learn new skills on the job assumes greater importance.

The rapid increase of available knowledge has particular significance for education. Content teachers frequently lament their inability to cover all the material in the content curriculum. The increased knowledge bases of many subjects quantitatively compound this task. It is clear that a different strategy is in order—one that emphasizes developing the lifelong learning and thinking skills necessary to acquire and process information within an ever-expanding field of knowledge.

It is time that we reverse the pervasive emphasis in education on lower rather than on higher order learning, on recall rather than on reasoning, on students merely "reproducing" rather than producing knowledge. If the teachers and educators are to be successful in coping with the contemporary demands of the society, they cannot avoid focusing their major efforts in developing children who can think independently and critically.
If we are to foster and strengthen critical thinking in schools and colleges, we need a clear conception of what it is and what it can be. Within the field of philosophy attempts to teach thinking and problem solving have been prevalent since the time of Aristotle and Plato. John Dewy, who was simultaneously an educator, philosopher and Psychologist defined reflective thought as the "careful persistent examination of an action, proposal, or belief and the analysis or use of knowledge in the light of grounds that justify it and its probable consequences". Smith (1953) also emphasized the judgemental aspect of critical thinking as "what a statement means and whether to accept or reject it". In this landmark paper, "A concept of Critical Thinking" Ennis (1962) elaborated on Smith's definition of critical thinking by delineating skills that called for the application of formal and informal logic. Ennis has since then considerably expanded his concept of critical thinking.

According to Ennis (1985) "critical thinking is reflective and reasonable thinking that is focussed on deciding what to believe or do". In so defining, he considers it as a goal directed thinking in which critical thinker consciously and rationally thinks about his or her thinking with a view to applying it in other contexts. For Ennis then critical thinking is a practical activity concerned with making decision of what to believe or do. This decision making results from the interaction of a set of dispositions toward critical thinking with a set of abilities for critical thinking.

In more recent times philosophers such as Seigel (1980), Mcpeek (1984), Lipman (1988), Paul (1989) and Norris (1990) have devoted their attention to understanding the bases of critical thinking.

Paul Richard (1992) consider critical thinking in a strong sense.
On this view he distinguishes two important sense of critical thinking, a weak sense and a strong one. According to Paul, there are three groups of mental structures essential to the development of a critical thinking: (1) proficient micro-skills, such as the ability to recognise a vague sentence, a questionable assumption, a contradiction or inconsistency, an inference or implication; (2) refined macro abilities, such as the ability to read and write critically, engage in give-and-take of discussion and debate, evaluate sources of information, or create and explore arguments and theories; and (3) traits of mind, which are the intellectual virtues and moral commitments that transform thinking from a selfish, narrow-minded foundation to a broad, open minded foundation.

No other theorists in the critical thinking movement address the underlying issues with the depth of philosophical analyses that Siegel offers. According to him a critical thinker is one who is "approximately moved by reasons" (Siegel, 1989, p. 24). In so defining, he relate critical thinking with rationality he consider critical thinking as an embodiment of the ideal of rationality.

According to Mathew Lipman Critical Thinking is skillful, responsible thinking that facilitates good judgement because it (1) relies upon criteria (2) is self correcting, and (3) is sensitive to context" (Lipman, 1988). His account highlights six key elements in critical thinking: critical thinking is skillful thinking, responsible thinking, based on good judgement, based on criteria, self correcting and sensitive to context.

National Council for Excellence in Critical Thinking Instruction (1991) state "Critical thinking is the intellectually disciplines process of actively and skillfully conceptualising, applying, analysing, synthesising
or evaluating information gathered from or generated by, observation, experience, reflection, reasoning or communication as a guide to belief and action".

Within the field of psychology, interest in establishing a cognitive basis for a pedagogy that fosters thinking and reasoning in school learning has been continuously expressed by educators and psychologists at least since John Dewy. In 1945 Max Wertheimer in his book on productive thinking described an insightful series of studies on problems solving in mathematics and science. He distinguished productive thinking from "blind intuision", equated the former with grasping the essential structure of the problem. Psychologist interested in the nature of critical thinking such as Piaget, Guilford, Fuerestein, Sternberg, have been particularly concerned with characterising critical thinking as it is performed under the limitations of the person and environment.

According to Sternberg (1985) "Critical thinking comprises mental process, strategies, and representation people use to solve problems, make decisions, and learn new concepts". This account of critical thinking is based upon his Triarchic Theory of Human Intelligence, which views thinking skills as a subset of intelligent functioning.

Critical thinking has been defined variously by various distinguished scholars. However, a close examination of these definitions reveal that to a great extent all these definitions say same thing in different ways. The amount of agreement among scholars regarding the nature of critical thinking clearly outweigh the disagreement.

Recent literature in the field of critical thinking has included
definitions and analysis of critical thinking ranging from the broad definitions of Seigel (1988) to the detailed articulation of skills and dispositions found in the work of Ennis (1985). Most of the main account of critical thinking including those of Ennis, Paul, Mcpeck, Seigel, Sternberg, agree at least to this extent; critical thinking has (at least) two central components: a cognitive component, which involves abilities and skills relevant to the proper understanding and assessment of reasons, claims, and arguments, and an affective component which is understood as a complex of dispositions, attitudes, habits of mind, and character traits.

Thus, we observe that critical thinking is the art of self-monitored, self-correcting, and self-disciplined thought. Critical thinkers apply internal standards of thoughts to their thinking while they think. Clarity, accuracy, precision, consistency, relevance depth and breadth are standards that apply to all disciplined thought. A critical thinker is one who appropriately move by reasons. He has a willingness and an ability to scrutinise and evaluate thinking - one's own as well as others' - to determine truth, accuracy, or worth and to construct logical arguments to justify claims or assertions. Such a thinking is called critical because it judges according to prescribed criteria, not because it is negative or accusatory. The abilities to recognise, analyse, judge and formulate valid argument through the application of reasoning and rules of logic are central to critical thinking.

The programs for developing critical thinking skills have been with us for thousands of years, although they have not always been recognised as such. The traditional name for such programs has been logic. In recent years a good deal of interest has been expressed concerning the possibility of teaching thinking skills, and a number of
concerned, what psycho-contextual factors promote it, and what socio-demographic variables influence the development of critical thinking of the students.

In abroad a good deal of research had gone into the area of critical thinking. Research in critical thinking relates to various psycho-contextual factors such as intelligence, gender, socio-economic status, academic achievement, the use of teaching strategies and years of teaching experience of teacher.

Results of the previous researchers on gender variations are not conclusive. Some studies have reported significant gender difference in favour of boys whereas some have reported in favour of girls. There are also studies which have reported no significant gender difference in critical thinking. Almost all studies have reported significant correlation between critical thinking and intelligence. The relationship between critical thinking and academic achievement was studies by several researchers. Most of them have reported significant correlation between academic achievement and critical thinking with an exception of a few studies. With regard to critical thinking and socio-economic status, most of the studies have reported no significant correlation. Teachers use of critical thinking strategies in relation to years of experience and level of education was studied and the findings were somewhat contradictory.

To the best of the knowledge of the researcher, only a limited number of studies have so far been conducted in India. Thus critical thinking is one of the most neglected area of research in our country. This necessitates studies to be conducted by the researchers in India. Of the studies conducted so far in India, significant positive correlation between critical thinking and achievement was found by five researchers.
Three of these studies were limited only to achievement in science and the remaining two studies were limited only to achievement in science and the remaining two studies were conducted on B.Ed trainees and higher secondary students. There are no studies conducted on secondary school students to find out the correlation between critical thinking and achievement in different school subjects as well as achievement as a whole. Studies on gender difference in critical thinking is inconclusive. Hence, more studies need to be conducted to confirm the findings of sex difference in critical thinking. Rural-urban and government-private school difference in critical thinking is not significant. Only two studies in each of the above categories may not be considered sufficient to arrive at valid conclusions regarding school difference (Management and Location) in development of critical thinking.

Moreover, there are not studies conducted so far to find out the possible influence of socio-economic status, home background, teachers experience, use of critical thinking strategies on critical thinking. Hence, there is a necessity to study critical thinking in relation to these variables.

Considering the facts states in the proceeding paragraphs it was thought necessary to study the development of critical thinking among the secondary school students in Indian context. If one knows, the current level of critical thinking that students possess, the methods that teachers currently use to develop it, the Psycho-contextual factors which promote it, and the socio-demographic variables which influence the development of it, in Indian situation, the process of developing critical thinking abilities in our students would be greatly improved.
Hence, keeping in mind the facts stated above the researcher decided to conduct the study entitled:

"Development of Critical Thinking Among Secondary School Students in Relation to Some Psycho-Contextual Variables".

**Objectives of the study**

The present investigation was conducted:

1. To establish the norms for critical thinking ability of the secondary school students in the state of Goa;

and to study the:

2. levels of critical thinking of the secondary school students;

3. correlation between critical thinking and intelligence eliminating the effect of socio-economic status;

4. correlation between critical thinking and socio-economic status eliminating the effect of Intelligence;

5. correlation between critical thinking and academic achievement in different school subjects eliminating the effect of intelligence;

6. variance, if any, in critical thinking between the students studying in rural and urban schools eliminating the effect of intelligence.

7. variation, if any, in critical thinking between the students studying in government and private schools eliminating the effect of intelligence;
8. variation, if any, between boys and girls in critical thinking eliminating the effect of intelligence;

9. variation, if any, in critical thinking between the students coming from Nuclear and Joint families eliminating the effect of intelligence;

10. variation, if any, in critical thinking between Marathi speaking students and Konkani speaking students eliminating the effect of intelligence.

11. variation, if any, in critical thinking among Hindu, Muslim and Christian students eliminating the effect of Intelligence;

12. extent to which the secondary school teachers make use of the various techniques/strategies for developing critical thinking in their students;

13. variation, if any, in the use of critical thinking teaching strategies between Government and Private school teachers;

14. variation, if any, in the use of critical thinking teaching strategies among Science, Social Studies and Language teachers;

15. variation, if any, in the use of critical thinking teaching strategies among teachers who have teaching experience of 0-5 years, 10-20 years and above 25 years;

16. variation, if any, in the use of critical thinking teaching strategies between the teachers of high critical thinking (students) schools
17. home background of students having high and low levels of critical thinking.

Hypotheses of the Study

To realise the objectives stated above (except objective Nos. 1, 2, 12 and 17) the following hypotheses were tested.

1. There is no significant positive correlation between critical thinking appraisal scores and intelligence test scores eliminating the effect of Socio-economic status scores.

2. There is no significant positive correlation between critical thinking appraisal score and SES score eliminating the effect of intelligence test scores.

3. There is no significant positive correlation between critical thinking appraisal scores and academic achievement scores in each of the school subjects, as well as academic achievement as a whole eliminating the effect of intelligence test scores.

4. There is no significant difference between the mean critical thinking scores of rural and urban school students eliminating the effect of intelligence test scores.

5. There is no significant difference between mean critical thinking scores of government and private school students eliminating the effect of intelligence test scores.

6. There is no significant difference between boys and girls in their
mean critical thinking scores eliminating the effect of intelligence test scores.

7. There is no significant difference between the mean critical thinking scores of students coming from nuclear and joint families eliminating the effect of intelligence test scores.

8. There is no significant difference between mean critical thinking scores of Marathi speaking students and Konkani speaking students eliminating the effect of intelligence test scores.

9. There is no significant difference of mean critical thinking scores among Hindu, Christian and Muslim students eliminating the effect of intelligence test scores.

10. There is no significant difference between the mean critical thinking teaching strategy scores of Government and private school teachers.

11. There is no significant difference in mean critical thinking teaching strategy scores among Science, Social Studies and Languages teachers.

12. There is no significant difference in mean critical thinking teaching strategy scores among teachers who have teaching experience upto 5 years, 10-20 years and above 25 years.

13. There is no significant difference between mean critical thinking teaching strategy scores of the teachers of high critical thinking and low critical thinking (students) schools.
The various terms are operationally defined as follows:

1. **Critical Thinking:**
   
   Revised Watson-Glaser Critical Thinking Appraisal was used to measure critical thinking of students. Hence, critical thinking was operationally defined as the score obtained by an individual on the Watson-Glaser Critical Thinking Appraisal.

2. **Intelligence:**
   
   Culture Fare Intelligence Scale by Cattel et. al. was used to measure the intelligence of the students. Hence, intelligence was operationally defined as the score obtained by individual student on the Cattel Culture Fare Intelligence Scale.

3. **Academic Achievement:**
   
   The score obtained by the students in different subjects in the S.S.C. examination conducted by the Goa Board of Secondary and Higher Secondary Education in March 1998 was considered as their academic achievement.

4. **Socio-economic Status:**
   
   In the present study the socio-economic status of the students was measured in terms of caste, education, occupation, monthly income, assets, position in the society and facilities available at home. The socio-economic score of the students were the score obtained by taking the weightages assigned to various sub-categories under the seven variables mentioned above based on the scoring key/scheme developed/adapted by Pradhan and Behera (1997).

5. **Contextual Variables:**
   
   In the present study, the students immediate setting (i.e., the
school and the home) was considered.

6. **Teaching Strategies:**

The specific teaching behaviour exhibited by the teachers in the classroom while teaching different subjects which are relevant for the development of critical thinking were considered as the teaching strategies.

7. **Home Background:**

Home background of a student in the present study include the following:

- i) Parents education and occupation
- ii) Economic status of the family
- iii) Types of family and size of family
- iv) Language (mother tongue)
- v) Religion
- vi) Facilities and practices in the home and surroundings.
- vii) Parents child and/or significant elder-child interaction.

The present investigation studied the critical thinking abilities of the secondary school students studying in different types of schools in India in relation to different variables like intelligence, academic achievement, home background, nature and location of schools and teaching strategies. However, the study is limited to the government and private wised schools of the state of Goa. The students studying in the academic year 1997-98 were investigated which was again confined to Class X. The study of teaching strategies was confined to the teachers working in the selected sample of 10 percent of schools. The home background of only those students who were having high and low level of critical thinking was studied.
Method of Study

Descriptive comparative survey method was used in this study. All the secondary school students in different types of schools and their teachers in the academic year 1997-98 in the state of Goa were the accessible population of the study. Ten percent of the schools (27 schools) of each of the four categories viz: Rural Government, Urban Government, Rural Private and Urban Private were selected using stratified random sampling technique. The final data producing sample consisted 918 students of Class X (one division from each school) and 209 teachers from these schools.

The following data gathering tools were used to collect data for the present study.

2. Culture Fair Intelligence Scale-III (English) by Cattel et. al.
3. Critical Thinking Teacher Behaviour Inventory (CTTBI).
4. Home Background Data Sheet (HBDS).
5. Information Schedule.

The investigator personally visited all the schools and collected the data in three phases as follows:

Phase I: Collection of data from students (critical thinking, intelligence and Home background).

Phase II: Administration of critical thinking teaching Behaviour Inventory.

Phase III: Collection of academic achievement score.

On completion of the data collection the responses of the subjects recorded in the answer sheets were scored following the instructions
given in the manual and the scoring key provided/developed for the purpose. The scores were tabulated keeping in view the objectives and hypotheses of the study. The researcher used different statistical techniques such as Pearson's Product Moment Method of Correlation and partial correlation, t-test, ANOVA, ANCOVA, Frequency and percentage analysis, and content analysis to analyse the data.

5.1.1 Major Finding of the Study

The following are the major findings of the present study.

1. Standard X students included in the study found to have average level of critical thinking.

2. Significant positive but low correlation between critical thinking and intelligence eliminating the effect of socio-economic status was found.

3. There existed significant positive but low correlation between critical thinking and socio-economic status. But after eliminating the effect of intelligence, no significant correlation was found between the two variables.

4. Significant positive but low correlation between critical thinking and academic achievement (in each subject separately as well as achievement as a whole i.e., all subjects together) was found.

5. The Rural and Urban school students did not differ significantly in their critical thinking ability.

6. The Government and private school students did not differ in their critical thinking ability.
7. Significant difference between the mean critical thinking scores of boys and girls was found. But eliminating the effect of intelligence, no significant difference was found between the two means.

8. There was no significant difference in critical thinking ability between the students from nuclear and joint families.

9. The Marathi speaking and Konkani speaking students did not vary in their critical thinking ability.

10. The Hindu, Christian and Muslim students did not differ in their critical thinking ability.

11. A very negligible percentage of teachers used critical thinking teaching strategies very often and thirty seven percent of teachers used these strategies often. More than fifty percent of teachers used the strategies only sometimes and a very negligible percentage used hardly any of these strategies.

12. The Government and Private school teachers did not differ in the extent to which they used critical thinking teaching strategies.

13. The Science, Social Studies and the Language teachers did not differ significantly in the use of critical thinking teaching strategies.

14. The teachers who had teaching experience of upto 5 years, 10-20 years and above 25 years did not differ in the extent to which they used critical thinking teaching strategies.
15. The use of critical thinking teaching strategies by the teachers of the high and low critical thinking schools differ significantly and the difference was in favour of teachers teaching in the high critical thinking schools.

16. Home background of students have a significant influence on the development of critical thinking ability.

5.2 Conclusions

Based on the findings of the study the following conclusions were drawn.

1. Students of Std. X in Goa possess average level of critical thinking ability.

2. Critical thinking is significantly positively correlated with intelligence.

3. There is no significant correlation between critical thinking and socio-economic status.

4. There is significant and positive correlation between critical thinking and academic achievement of secondary school students.

5. Locality of students (residing in rural or urban areas) does not have differential effect on development of critical thinking among secondary school students.

6. Types of schools (Government or Private managed) do not produce differential effect on the development of critical thinking ability among the secondary school students.
7. Gender is not a factor associated with development of critical thinking ability among secondary school students.

8. Type of family (Nuclear or Joint) is not a factor associated with development of critical thinking among school children.

9. Mother tongue of a child (speaking Marathi or Konkani) does not affect the development of critical thinking ability.

10. Religion is not a factor associated with development of critical thinking ability.

11. Majority of the secondary school teachers in Goa use critical thinking strategies only sometimes.

12. Government and private school teachers use critical thinking teaching strategies to the same extent.

13. Secondary school teachers teaching different subjects use the various critical thinking teaching strategies to the same extent.

14. Years of teaching experience of teachers is not a factor related to the extent to which they use the different critical thinking teaching strategies.

15. Use of different critical thinking teaching strategies by teachers in teaching different subjects helps in developing critical thinking ability of the students.
16. Home environment of the students affects the development of their critical thinking ability.

5.3 Recommendations

Based on the findings of the study the following action points are recommended for implementation.

1. Since the students under study possess average level of critical thinking, there is an urgent need to sensitise teachers of secondary schools about the need and importance of developing critical thinking among the students. This can be done by organising seminars/workshops/orientation programmes by school complex, SIE, DIET and secondary teacher education institutions in the state of Goa.

2. Since the study revealed that majority of teachers use critical thinking strategies only sometimes it is necessary that the teachers make conscious efforts to use the critical thinking teaching strategies as frequently as possible during teaching learning process in various school subjects. Intensive programmes/workshops needs to be conducted for the teachers to develop in them the skills of using various strategies. The workshops and seminars may focus on (i) Self reflection and critical analysis of the present methods followed (ii) exposure to critical thinking strategies (iii) approaches to incorporate the critical thinking strategies in the teaching learning process and (iv) remodelling the lesson plans incorporating the critical thinking strategies.
3. Exposure to methods of developing critical thinking could be emphasised during the pre-service teacher education programme by the teacher education institutions. The skills of using various critical thinking strategies should be developed in the prospective teachers during the pre-service programmes itself. Necessary training may be provided to them for incorporating the critical thinking teaching strategies in the lesson plans of different school subjects.

4. Since better quality home background has positive influence on development of critical thinking of students, the parents need to be oriented accordingly. This could be achieved by strengthening parent-teachers' associations. Parents should be made to understand the importance of providing a democratic home atmosphere in which ideas/views of their wards are encouraged and valued. Also for fostering thinking the importance of encouraging discussion of wide variety of subject matters by way of questioning, inquiring, arguing and sharing must be made known to the parents.

5. The study revealed that facilities and practices in the community too influence the development of critical thinking. This necessitates establishing a strong school community relationship. Critical thinking is shaped not only at home and school but community has also a major role to play. Students must be made to interact with the community by organising various community linked activities and also by making students play an active role in the activities organised by the community.

6. The notion that the private schools are better than government schools and urban schools are better than rural schools does not
hold good in the case of critical thinking. The study revealed the fact that the rural/government schools and urban/private schools student posses the same level of critical thinking. Hence it is necessary that all teachers irrespective of the types of schools in which they teach should make conscious efforts for enhancing critical thinking ability of their students by incorporating various critical thinking teaching strategies in teaching of different school subjects as well as by conducting various activities/programmes like debate, discussion, elocution etc.

7. Curriculum should be flexible. Rigid following of textual matters as it is should be avoided if one has to develop critical thinking among students. In this age of knowledge explosion, the teachers are unable to take the responsibility of transferring entire information to the students, instead students should be made independent by developing their critical thinking ability so that they are able to gather and process information by themselves. Coverage of syllabus in a stereotyped fashion and evaluating the lower order skills of recall should be done away if one is serious about fostering this ability.

8. The existing hue and cry about lowering academic standards could be taken care by developing critical thinking among students. Since the study revealed substantial relationship between critical thinking and achievements in different subjects, improvement in the first factor would naturally secure improvement in the second factor as well. Hence, it is necessary that critical thinking ability be properly emphasised in teaching different subjects. Critical thinking should be consciously cultivated through variety of situation; classroom teaching, in the laboratory, field study situations and through literary and cultural activities.
5.4 Suggestions for Further Research

1. The same study may be replicated on the students studying in other class levels.

2. The rural urban variation in development of critical thinking may be investigated in other geographical areas.

3. Critical thinking is a complex ability which takes times to develop. Longitudinal/Developmental studies may be undertaken to investigate the development of critical thinking skills over a period of time.

4. Teachers perception and attitudes towards teaching for developing critical thinking could be investigated by researchers in Indian context.

5. Studies can be taken up to ascertain the levels of critical thinking of teachers.

6. Since test results may not reflect all that transpires during a study of students' critical thinking skills, studies having a larger qualitative component in the design would be useful.

7. Intervention studies using programs that aimed at developing critical thinking may be taken up.

8. An indepth study can be conducted regarding the use of critical thinking teaching strategies by employing various techniques like participant observation, interviews etc.