CHAPTER FIVE

SUMMARY AND CONCLUSION
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5.0.0.0 Prologue:

This chapter presents a brief summary of the study under the captions introduction, need for the study, statement of the problem, objectives, operational definitions of the terms used in the study, assumptions, scope and limitations of the study, methodology and procedure, design, sample, tools, procedure of data collection, analysis of data, findings and conclusions, educational implications of the study and suggestions for further research.

5.1.0.0 Introduction:

Teaching is a complex act and no single factor can entirely explain or describe the qualities of a “good” or “effective” teacher as well as teaching. It is an interactive process aimed at desirable product called learning. As an interactive process, teaching includes both verbal and nonverbal activities of the teacher and the pupils.

Researches on ‘teaching’ have usually employed outcome measures at the end of the instruction to quantify learning while ignoring changes that occur during learning. But it is the process of change from ignorance to competence, which needs to be the major focus of instructional psychology.

The teaching process is a set of activities related to teaching behaviour. These behavioural patterns are expected to occur in a particular sequences. These sequence can be classified into various meaningful categories such as strategies, methods, patterns.

Strategies are more general in nature and deal with approaches such as expository, discovery, inductive and deductive. The teacher has to modify or adopt these strategies to suit the particular situation. Then these
strategies are converted into methods of teaching. Methods of teaching deal with a sequence of presentation of content in the classroom. When a particular strategy or method is implemented in an actual classroom, by interaction with different types of pupils, it is translated into different teaching patterns. Therefore, teaching patterns are observable forms of a particular teaching strategy or a method.

The school curriculum through the teaching of different subjects, viz., Language, Mathematics, Sciences, Social Sciences and Arts, aims at the fulfillment of national objectives of education. Among these school subjects the essential purpose of teaching social science is to develop competent and caring individuals who can make decent decisions for the common good. Social science among all school subjects, contributes the most towards cultivating those attitudes and skills which are absolutely necessary for the development of good citizenship.

If one reviews research studies on teaching one finds very little attempt being made to enhance the present inadequate conditions of teaching social science, in particular, history, in Indian classrooms. It is necessary to use improved and effective strategies and methods of teaching social science, in particular history to achieve its higher objectives of teaching. Therefore, the present study was designed and implemented by the investigator. The title of the study was as stated below:

“A study of the effects of the inductive and deductive methods of teaching history on the achievement and thinking operations of the pupils of Standard IX with different creative problem solving styles”.

5.2.0.0 Need for the Study:

To educate the coming generation that will have the competency to tackle its problem with confidence and determination, ‘The National Policy on Education (1986)’ has advocated child centred and activity based processes of learning. In order to realize this a teacher has to organize
learning situations to stimulate curiosity and independent thinking through observation of phenomena, creative thinking and activities.

Social science is a subject that touches daily life at many points. It can play an important role in training citizens capable of thinking intelligently. History as well as other social sciences provide a fertile ground for the teacher to develop thinking and reasoning skills in the learner since the learning of social sciences like science and mathematics teaching involves the process of thinking and reasoning. The study of social sciences, in particular, history also helps the pupils to develop appropriate attitudes towards others and acquire the skills that enable to function effectively as individuals and as members of group in the national and world society. Therefore, it is necessary that the teachers of social sciences use suitable teaching strategies and develop purposeful teaching programme to enhance and enrich information acquisition skills, information – processing skills and interpersonal / social skills of the students.

The teacher has many alternatives or options to use different teaching strategies to elicit thinking, to teach problem – solving skills and achieve the above mentioned objectives of teaching social sciences. The inductive and deductive reasoning strategies are scientific approaches to information – acquiring and information processing and hence are appropriate strategies to teach thinking. These strategies could be used to teach any school subjects including social sciences.

Research in teaching social sciences and specially history is a neglected area in India. The researches related to social sciences in general which are reported in five surveys of research studies have been mostly repetitive and of a stereo typed nature, with no major findings providing a new direction either to a curriculum development or to teaching learning strategies. These studies have usually examined the relationship between instructional techniques or teacher behaviour and their effects on student outcomes.
The tenuous nature of history as one of the social sciences taught in schools and the seeming failure of traditional history instruction make it evident that study of history in primary and secondary schools needs newer directions to objectives and new strategies. Because of the momentous problems that the citizens of our country will face in the future, the development of thinking and reasoning skills, proper attitude towards the historical past and the formulation of historical generalizations should be the primary objectives of teaching history to our students. Besides studying the products of history as found in school books and the sources, students also need to master problem-solving skills to solve historical problems. The inductive and deductive methods of teaching which follow systematic thinking and reasoning process, provide a wide scope to follow problem solving and discovery approaches to learning. Hence, the investigator felt the need to investigate the comparative effects of these methods of teaching on developing thinking operations, logical reasoning, attitude towards social and citizenship skills and enhancing achievement of students.

5.3.0.0 Statement of the Problem:

A study of the effects of the inductive and deductive methods of teaching history on the achievement, thinking operations, logical reasoning and attitude towards social and citizenship skills of pupils of Standard IX with different creative problem solving styles.

5.4.0.0 Objectives of the Study:

i. Objectives related to Presage – Product:

a. To study the comparative effects of the inductive and the deductive methods of teaching history on the achievement, development of thinking operations, logical reasoning and attitude towards social and citizenship skills of pupils of standard nine with convergent and divergent creative problem solving styles.
b. To study the comparative effects of the inductive and the deductive methods of teaching history on the achievement, development of thinking operations, logical reasoning and attitude towards social and citizenship skills of pupils with convergent and divergent creative problem solving styles after partialling out the effects of intelligence and pre-achievement.

ii. Objective related to Presage-Process

To study and compare the teaching processes in terms of interaction patterns associated with the inductive and the deductive methods of teaching history.

iii. Objective related to Context – Process

To study and compare variation in interaction patterns due to change in creative problem solving styles of pupils with respect to the inductive and deductive methods of teaching history.

iv. Objective related to Process – Product

To explain the relationship between significant differences in achievement, development of thinking operations, logical reasoning and attitude towards social and citizenship skills in terms of differences in teaching processes.

5.5.0.0 Operational Definitions of the Terms used in the Study:

i. Inductive Method of Teaching

The inductive method of teaching is based on inductive reasoning which is a thinking process where thinking proceeds from specific to general.

In the present study, in the inductive method of teaching, the teacher presented the learning material to the pupils in the form of examples to enable them to arrive at a definite rule, fact or generalization on the basis of their observation.
ii. Deductive Method of Teaching

The deductive method is a method of teaching which is based on deductive reasoning that proceeds from rule or generalization to examples and subsequently to conclusions or to the application of the generalization.

In the present study in the deductive method of teaching, the teacher began with the presentation of generalization followed by presenting of learning material in the form of examples related to generalization.

iii. Achievement in History

The learning attained in the form of knowledge, comprehension and critical thinking by the sample related to the units of content in history of standard nine which was used for treatment in the present study was considered as achievement. It was tested before and after the treatment.

iv. Thinking Operations

Thinking operations are activities that elicit thinking. They are intellectual skills or processes which help the learner to go beyond memory and develop useful forms of knowledge. The thinking operations taken for the present study were:

a. Observation  
d. Interpretation
b. Comparison  
e. Inference
c. Summarization  
f. Criticizing and evaluating.

v. Logical Reasoning

Logical reasoning is a systemic thinking process associated with problem-solving ability of an individual. Reasoning is usually classified into two types – deductive and inductive. The deductive reasoning is which the individual draws a conclusion on the basis of
general principles related to the problem where by in the inductive reasoning the individual on the basis of a specific incidence propagates a law and acts according to it. In the present study the problem—solving ability of pupils was considered as logical reasoning ability.

vi. **Attitudes towards Social and Citizenship Skills**

Attitudes towards social and citizenship skills are attitudes which are basic to good and democratic citizenship. Social and citizenship skills are those citizenship qualities required of a citizen for an effective social participation and democratic living in the society. Social and citizenship skills chosen for the present study were co-operation, tolerance, service, patriotism and equality of citizens.

vii. **Pupils of Standard Nine**

The pupils of standard nine were those studying in the selected two aided private girls schools situated in rural areas of Karnataka of the age group of 12-15 years during the Academic year 2000 – 2001.

viii. **Creative Problem Solving Styles**

According to Basadur’s (1987) model of creative problem solving, an unique personal style of creative problem solving can be identified for each individual. These styles could be broadly classified as divergent and convergent styles and they depend on how the individual tends to prefer to learn and prefers to use the knowledge learned in the creative problem solving process.

5.6.0.0 **Assumptions of the Study :**

The following assumptions were framed at the outset of the study:

i. Thinking and reasoning processes can be developed in the learner by creating suitable learning environment;

ii. Teaching methods are content and objective specific;
iii. Pupils' achievement is enhanced through the inductive and deductive methods of teaching;

iv. Attitudes of pupils towards particular values can be changed through teaching;

v. There exists a relationship between the methods and the interaction pattern of teaching;

vi. The interaction pattern specific to a particular teaching method varies due to change in pupil characteristics;

vii. There exists a relationship between the teaching process and the learning outcomes;

viii. The learning outcomes in pupils varies due to change in teaching methods and pupil characteristics.

5.7.0.0 Scope and Limitations of the Study:

i. This study was limited only to girls students selected from two aided private high schools of rural areas of Udupi and South Kanara Districts of Karnataka State.

ii. Most of the students were from middle and lower middle classes of the society.

iii. There were thirty three students in each sub-group. Thus the total sample was limited to 132.

iv. The teaching units were selected from the history text book of Standard IX history of Karnataka State.

v. The students with convergent and divergent creative problem solving styles were taught through the inductive and the deductive methods of teaching, each group in each of the two schools separately by the same teacher.
vi. Fifteen lessons on fifteen topics on history were taught for fifteen school periods to each of the four subgroups. Thus, the total treatment period was limited to sixty school periods.

vii. The study was limited to find the comparative effects of the inductive and the deductive methods of teaching history on pupils achievement, developing thinking operations, logical reasoning and attitude towards social and citizenship skills.

viii. In the present study the teaching-learning process of the group and not of individuals was studied.

5.8.0.0 Methodology and Procedure of the Study:

The study comprised of two major aspects:

i) Field study;

ii) Experiment.

The details about the methodology and procedure followed with respect to field study and experiment are given in subsequent sections.
### 5.8.1.0 Design of the Study

#### Table 5.1 Research Design of the Study

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<td>Selection of Variables involved in the Study</td>
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- Convergent Creative Problem Solving Style.
- Divergent Creative Problem Solving Style.

- a. Selection of Sample of Students of Standard Nine for the Study
- b. Classification of Sample Based on their Creative Problem Solving Styles.

- Context Variables
  
- a. Selection of Sample of Students of Standard Nine for the Study
  
- b. Classification of Sample Based on their Creative Problem Solving Styles.

- i. Preparation of Achievement Test in History.
- ii. Preparation of Test in Thinking Operations.
- iii. Preparation of Attitude Scale to Measure the Attitude Towards Social and Citizenship Skills.
### Phase Five
**Treatment**

**Procedure of Treatment:**

1. Fifteen Teaching Sessions Each of Inductive Method of Teaching History for Pupils with Two Different Creative Problem Solving Styles.
2. Fifteen Teaching Sessions Each of Deductive Method of Teaching History for Pupils with Two Different Creative Problem Solving Styles.
3. Audio Recording of Each Lesson for Process Analysis.

### Phase Six
**Post-Treatment**

**Administration of Post-Treatment Tests:**

1. Achievement Test in History.
2. Test on Thinking Operations.
3. Test on Logical Reasoning.
4. Attitude Scale to Study Social and Citizenship Skills.

### Phase Seven
**Analysis of Data**

**Analysis of Presage-Product Part of the Experimental Study through:**

1. Analysis of Co-variance
2. 't' test.

**Analysis of Teaching Process through:**

2. Descriptive Analysis.
3. 't' test.

**Findings of the Study.**

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### 5.8.2.0 Field Study:

Field studies are useful for bridging the gap between theory and practice. Field studies in teaching can be as simple as describing the teaching phenomena to, as complex as establishing relationships between observed teacher behaviours and their effect on pupils' achievement. In the
present investigation, a field study was undertaken for a specific but with a limited purpose. The objectives of the field study are given below.

i. To study the methods adopted by the teachers to teach social science in general and in history in particular;

ii. To determine the extent to which the teachers of social science facilitate their pupils to develop thinking operations through the classroom teaching learning process;

iii. To collect the general information about the teaching of social science in secondary schools;

iv. To study the various measures taken by the teachers to teach social science effectively, in general and in history, in particular.

5.8.2.1 Sample for the Field Study:

There were three sets of samples chosen for the field study as per the design.

a) Sample for the Administration of the Questionnaire:

This sample comprised of forty history / social science teachers teaching Standard IX belonging to twenty two schools. Out of these twenty two schools, fifteen were private aided schools and seven were private unaided schools.

b) Sample for the Interview:

The investigator selected 50% of the sample selected to administer the questionnaire, for the conduct of interview.

c) Sample for the Observation of Lessons:

The sample comprised of fifty history / social science teachers of secondary schools. The schools and teachers were selected based on their readiness to co-operate with the investigation.
5.8.2.2 Tools used for the Field Study:

i) Questionnaire to Teachers on Social Science Teaching;

ii) Observation Schedule on Teachers' Lessons.

5.8.2.3 Procedure of Data Collection:

a) Data Collection through the Questionnaire and the Interviews:

The questionnaire on social science teaching prepared by the investigator was administered to the forty teachers teaching social science in Standard IX belonging to twenty-two schools of five different districts of Karnataka. After going through their responses, out of forty teachers, about twenty were personally interviewed to get more clarification on the responses. The analysis was done based on the responses given by forty teachers, using percentages.

b) Data Collection through Observation of Lessons:

The lesson observation schedule prepared by the investigator was used by the investigator to observe the lessons in social science of sample of teachers selected for the study. The purpose of this observation was to study the present condition of teaching social science and specially history, in secondary schools. The chi square technique was used to analyze the observation schedules of teachers' lessons.

5.8.3.0 Experimental Study:

5.8.3.1 The Design of the Experimental Study:

A 2 x 2 factorial design was used. Two levels of methods of teaching and two levels of creative problem solving styles of pupils were decided upon by the investigator. The two levels of methods of teaching were the inductive and the deductive methods of teaching history. The convergent and the divergent problem solving styles were two creative problem solving styles of pupils. The design is schematically represented in Table 5.2.
<table>
<thead>
<tr>
<th>Methods</th>
<th>Inductive (A₁)</th>
<th>Deductive (A₂)</th>
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<tr>
<td>Styles</td>
<td>Covariates</td>
<td>Dependent variables</td>
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<tr>
<td>↓</td>
<td>X₁, X₂</td>
<td>Y₁, Y₂, Y₃, Y₄</td>
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<td>C</td>
<td>1.X₁₁₁, X₂₁₁</td>
<td>Y₁₁₁, Y₂₁₁, Y₃₁₁, Y₄₁₁</td>
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<td>2.X₁₁₂, X₂₁₂</td>
<td>Y₁₁₂, Y₂₁₂, Y₃₁₂, Y₄₁₂</td>
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<td>3.X₁₁₃, X₂₁₃</td>
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<td>V</td>
<td>4.X₁₁₄, X₂₁₄</td>
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<td>Y₁₂₂, Y₂₂₂, Y₃₂₂, Y₄₂₂</td>
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<td>V</td>
<td>3.X₁₂₃, X₂₂₃</td>
<td>Y₁₂₃, Y₂₂₃, Y₃₂₃, Y₄₂₃</td>
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<td>4.X₁₂₄, X₂₂₄</td>
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<td>5.X₁₂₅, X₂₂₅</td>
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<td>T</td>
<td>3₃.X₁₂₆, X₂₂₆</td>
<td>Y₁₂₆, Y₂₂₆, Y₃₂₆, Y₄₂₆</td>
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</tbody>
</table>

X₁ : Scores of test on intelligence – covariate.
X₂ : Scores on pre-test of four dependent variables – covariate.
Y₁, Y₂, Y₃, Y₄ : Scores on post-test of four dependent variables.
Y₁ : Post-test scores on test on achievement in history.
Y₂ : Post-test scores on test on thinking operations.
Y₃ : Post-test scores on logical reasoning.
Y₄ : Post-test scores on attitude towards social and citizenship skills.
5.8.3.2 Variables in the Study:

The four types of variables used in the present study are listed below.

i. Independent Variables:
The Inductive and the Deductive methods of teaching.

ii. Dependent Variables:
   a. Achievement in history;
   b. Developing the specified thinking operations;
   c. Developing logical reasoning;
   d. Change in attitude towards social and citizenship skills.

iii. Control Variables / Covariates:
   a. Intelligence;
   b. Pre-achievement.

iv. Context Variables:
   a. The Convergent Creative Problem Solving Style;
   b. The Divergent Creative Problem Solving Style.

5.8.3.3 Sample for the Experimental Study:

The investigator selected at random two girls’ high schools, both situated in rural areas and more or less having homogeneity with respect to age, sex, social and economic background of pupils, location of schools and the medium of instruction. In both of these schools there were two sections in Standard IX with more than thirty five students in each of the sections. These were aided private schools and the medium of instruction was Kannada.

These schools were:

a. Carmel Girls’ High School, Kemmannu, Udupi District.

b. Carmel Girls’ High School, Bantwal, South Kanara District.

In each of these schools the pupils of Standard IX were classified based on their creative problem solving styles. Based on the scores obtained on an inventory on creative problem solving styles by Basadur (1987), thirty
three pupils each were assigned to the convergent and divergent groups. Accordingly, sixty six pupils from each school were selected, hence, the total sample was 132 pupils.

The investigator selected by casting lots, Carmel Girls’ High School Bantwal for teaching through the inductive method and Carmel Girls’ High School, Kemmannu, for teaching through the deductive method.

5.8.3.4 Tools Used:

Six different types of assessment tools were used for the study. They are listed below:

a. Creative Problem Solving Inventory by Min Basadur;
b. Raven’s Standard Progressive Matrices;
c. An Achievement Test in History;
d. Test on Thinking Operations;
e. An Attitude Scale to Measure the Attitude towards Social and Citizenship Skills;
f. Reasoning Ability Test by Sadhana Bhatnagar.

5.8.3.5 Instructional Material:

a) Lesson Plans:

Fifteen lesson plans each based on the inductive and the deductive strategies of teaching were prepared by the investigator on the fifteen topics from the history text book of Standard IX of Karnataka State.

b) Work Sheet:

The Worksheet was designed by the investigator for the learners to be followed while teaching through the inductive method.

5.8.3.6 Procedure for Data Collection:

The procedure in which the present study has been conducted comprised of three levels, viz., pre-test level, treatment, post-test level.
a) Pre-Treatment Phase / Measurement of Covariates:

Before starting the treatment the sample was tested on a number of variables using appropriate tools. The pre-treatment phase of the study is shown below with the help of Table 5.3

**Table 5.3 : Variables Measured and Tools Used at the Pre-Treatment Phase :**

<table>
<thead>
<tr>
<th>Variable Measured</th>
<th>Tools Used</th>
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<tbody>
<tr>
<td>a) Intelligence</td>
<td>Raven's Standard Progressive Matrices</td>
</tr>
<tr>
<td>b) Pre-achievement in History</td>
<td>Achievement Test in History (Prepared by the investigator)</td>
</tr>
<tr>
<td>c) Thinking Operations</td>
<td>Test on Thinking Operations (Prepared by the investigator)</td>
</tr>
<tr>
<td>d) Logical Reasoning</td>
<td>Reasoning Ability Test by Sadhna Bhatnagar.</td>
</tr>
<tr>
<td>d) Attitude towards Social and Citizenship Skills</td>
<td>Attitude Test on Social and Citizenship Skills (Prepared by the investigator).</td>
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</tbody>
</table>

b) Treatment:

A 2 x 2 factorial design was followed for the present research study. By using the Creative Problem Solving Style Profile, the students from each school were sub-grouped as the convergent creative problem solving style group and as the divergent creative problem solving style group. Each sub-group consisted of thirty three students.

According to the design of the study the investigator taught thirty lessons each on the fifteen topics selected from the textbook on history of Standard Nine, through the inductive and the deductive methods. The fifteen topics selected were taught using the two different methods to the students in each schools with convergent creative problem solving style and divergent creative problem solving style separately. Thus, a total of sixty lessons of the duration of forty to forty five minutes each were taught by the investigator to the four groups, viz., the total sample of 132 students.
Collection of the teaching process data:

Audio recording of all the sixty lessons was done by the investigator in order to analyze the teaching processes associated with the inductive and the deductive methods of teaching with respect to verbal interactions during the lessons.

c) Post-Treatment Phase:

At the end of the treatment phase the sample of students were post-tested on four dependent variables using appropriate tools. The details of the post-treatment phase are presented in Table 5.4

Table 5.4: Variables Measured and Tools used at the Post-Treatment Phase:

<table>
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<th>Variable Measured</th>
<th>Tools Used</th>
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</thead>
<tbody>
<tr>
<td>a) Achievement in History</td>
<td>Achievement Test in History</td>
</tr>
<tr>
<td>b) Thinking Operations</td>
<td>Test on Thinking Operations</td>
</tr>
<tr>
<td>c) Logical Reasoning</td>
<td>Reasoning Ability Test by Sadhna Bhatnagar</td>
</tr>
<tr>
<td>d) Attitude towards Social and Citizenship Skills</td>
<td>Attitude Test on Social and Citizenship Skills</td>
</tr>
</tbody>
</table>

5.9.0.0 Analysis of the Data:

i) Analysis of the post-test data:

For the detailed analysis of presage-product part of the present experimental study, where the comparative effectiveness of the inductive and deductive methods of teaching was done, the analysis of covariance technique was used. The post-test scores on four dependent variables such as achievement in history, developing thinking operations, logical reasoning and attitude towards social and citizenship skills were used for this analysis. The scores on intelligence of the sample and their prior achievement scores on above mentioned four dependent variables, considered as two covariates,
were controlled by using the factorial design and analysis of covariance technique.

The 't' test was also used to test the significance of the difference in means between the two groups.

ii) Analysis of the process data:

In order to study the interaction patterns associated with the inductive and the deductive methods of teaching, and variation in interaction patterns due to change in the creative problem solving styles of pupils and to study the relationship between teaching process and learning outcome related to four dependent variables of the study, the investigator transcribed all the sixty lessons which were audiotaped. Three seconds' interval was marked on all the transcripts of the teaching process.

Since it was impossible to analyze all the sixty lessons because of the lengthy process involved in the task, the investigator chose only the first, fifth, tenth and fifteenth lessons from each of the four groups, to do further analysis. Accordingly, sixteen lessons in all were chosen for studying the teaching process.

The data was coded by using the Flander's System of Interaction Analysis – Modified Version developed by Amidon and Hunter (1966). This modified version has 24 categories. Prior to coding the lessons, both inter-observer and intra observer reliabilities were established. Interaction patterns associated with the inductive and the deductive methods of teaching and variation in interaction patterns due to difference in creative problem solving styles of students were studied using different methods such as:

i) finding out percentage of time spent on different categories;
ii) studying percentage of time spent on various areas of the matrix;
iii) finding out various interaction ratios.

The difference between two interaction patterns was tested by using 't' test. The relationship between the teaching processes associated with the
inductive and the deductive methods of teaching and the learning outcome with respect to product variables was studied through qualitative analysis.

5.10.0.0 Findings and Conclusions of the Study:

a) Conclusions of the Field Study:

Keeping in view the objectives of the field study, the following findings were arrived at by the investigator on the basis of analysis of the data.

i. All the teachers involved in the study had undergone secondary teacher's training (B.Ed) and all had studied history or other social sciences upto graduation (B.A). All had offered methodology of teaching social science for their training qualification (B.Ed.);

ii. Teachers' teaching experience varied from 1 to 35 years;

iii. About 62.5% of teachers had attended seminar / workshop / refresher course of short duration related to teaching of social science. But most of the teachers availed of such opportunities to upgrade themselves only once during their teaching career.

iv. All the teachers had allowed their students to ask questions though 80% of them had allowed always and 20% had allowed some times;

v. Only 75% of the teachers had taken their students outside the classroom for curricular activities casually. The rest of the teachers had never taken their students outside classroom for any curricular activities;

vi. Teachers were using different types of written material in teaching. Text books, reference books and material related to current events were maximally used by the teachers;

vii. All the teachers were using different types of teaching aids in their teaching. They were either ready made or prepared by the students. Chalkboard, maps, atlas, globe, current events, sources, pictures were
some of the commonly used teaching aids by the teachers. Films, slides, filmstrips and multimedia were not used by the teachers at all;

viii. Most of the teachers were giving homework regularly. All the teachers were giving question and answer type homework. Other type of homework such as activities and writing of report, project work followed by writing of report, collection of sources and preparation of scrap books were also given to students by some of the teachers;

ix. With respect to activities and approaches related to teaching, all the teachers preferred to give lectures to the whole class. Most of the teachers were also giving assignments to be worked out individually or in groups in the form of cooperative study;

x. Most of the teachers were familiar with the inductive and the deductive approaches to teaching social sciences in particular, history. Except for a small percentage of them, all the others have been using either of these approaches in their teaching;

xi. All the teachers have been putting in special efforts in some way or the other to increase the achievement of their students in social science specially through creating opportunities for students' participation;

xii. According to most of the teachers, the important factors that contributed to effective teaching of social science were suitable curriculum approaches related to student centred teaching and learning, resourcefulness of teachers and proper learning environment.

The findings of the second part of the field study with respect to observation of in-service teachers' lessons in social science are listed here below.

i. Most of the teachers from the sample had facilitated the students to develop thinking operations through their teaching in the 'most desired' as well as 'desired way';
ii. As the teachers surveyed and observed in this field study were aware of the inductive and the deductive approaches to teaching, they have been using these approaches in their classroom teaching and thus have been enabling their students to develop related thinking operations.

b) Conclusions of the Presage-Product Study:

i. The inductive and deductive methods of teaching had a difference in their effect on achievement in history of pupils with convergent and divergent creative problem solving styles;

ii. The inductive method was more effective than the deductive method in increasing achievement in history of pupils with divergent creative problem solving style;

iii. The deductive method was more effective than the inductive method in increasing achievement in history of pupils with convergent creative problem solving style.

iv. The inductive and the deductive methods of teaching history had differential effect on pupils with convergent creative problem solving style with respect to developing thinking operations as the inductive method was more effective than the deductive method;

v. The inductive and the deductive methods of teaching history did not differ significantly in developing thinking operations in pupils with divergent creative problem solving style;

vi. There was significant improvement regarding the development of all the six thinking operations in pupils with divergent and convergent creative problem solving styles as a result of teaching through the inductive as well as the deductive methods of teaching history;

vii. The change in the methods of teaching and difference in the creative problem solving styles had brought about varied effects on pupils with respect to developing thinking operations;
viii. The inductive and the deductive methods of teaching history differed in their effect on developing logical reasoning abilities in pupils with different creative problem solving styles;

ix. The inductive method was more effective than the deductive method of teaching in developing logical reasoning abilities of pupils with different creative problem solving styles;

x. The inductive method of teaching was more effective in developing logical reasoning abilities in pupils with divergent creative problem solving style than in pupils with convergent creative problem solving style.

xi. The inductive and the deductive methods of teaching history were equally effective with respect to developing attitude towards social and citizenship skills of pupils with convergent and divergent creative problem solving styles.

c) Conclusions with Respect to Presage – Process Study:

i. The interaction pattern associated with the deductive method of teaching history was as follows:

```
1                             2                             3
Teacher Lectures              Teacher Asks Convergent Questions  Teacher Gives Directions and Criticizes

4                             5                             6
Silence                       Teacher Praises                   Teacher Accepts Ideas through Description and Generalization
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ii. The interaction pattern associated with the inductive method of teaching history was as follows:

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<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Asks Cognitive Memory and Divergent Questions</td>
<td>Pupils Give Descriptive Inference and Generalization Responses</td>
<td>Pupils Initiation to Generalize</td>
</tr>
</tbody>
</table>

iii. The deductive method was associated with direct pattern, whereas the inductive method was associated with indirect pattern of classroom interaction;

iv. Lengthy lecturing followed by questioning, giving directions, domination of supervision of students' activities, criticism, corrections, rejecting students' ideas were the main features of the deductive method. Pupil talk, teacher talk following pupil talk, teacher directed pupils' participation and sustained pupil initiation or response were the main features of the inductive method.

d) Conclusions with Respect to Context – Process Study:

Inductive Method:

i. There was no significant difference between pupils with convergent and divergent creative problem solving style taught through the inductive method with respect to percentage of time spent on different categories except for category 10b: confusion;

ii. There was significant difference between pupils with convergent and divergent creative problem solving styles taught through the inductive method with respect to percentage of time spent on various regions of matrix and variation in different ratios. However, the teacher’s direct influence was more on the convergent group than on the divergent group;
iii. The percentage tallies for areas such as teacher's dealing with students on the affective plane, teacher talk followed by student talk and teacher's response to the termination of pupil’s talk with direct influence were significantly higher in the convergent group than in the divergent group;

iv. The ratios such as teacher's indirect to direct talk ratio and teacher's tendency to sustain a particular type of classroom communication or steady state ratio were significantly higher for divergent group and teacher question ratio was higher for convergent group;

v. Change in the creative problem solving styles of pupils had brought about change in the classroom interaction patterns associated with the inductive method of teaching, with respect to percentage of time spent on different categories, different regions of matrix and variation in different ratios.

**Deductive Method:**

i. The teacher asked more of convergent type of questions to the group with convergent creative problem solving style and more of divergent type of questions to the group with divergent problem solving style;

ii. The teacher gave more directions to the group with convergent creative problem solving style than to the group with divergent problem solving style;

iii. There was significant difference between convergent and divergent groups for category 10b, i.e., confusion and category 8b, i.e., pupils’ inference type of responses in favour of convergent group;

iv. The teacher's directions and domination of supervision of students’ activities was significantly more in convergent group than in divergent group taught through the deductive method;

v. Sustained pupil initiation or response was significantly more in the case of divergent group than the convergent group.
vi. The pupils' Steady State Ratio was significantly higher in the case of divergent group than for convergent group;

vii. The teacher was more direct in convergent group and indirect in divergent group while teaching through the deductive method.

Comparison of Variation in Interaction:

i. It was observed that the inductive method of teaching with respect to pupils with convergent and divergent problem styles was associated with the indirect classroom interaction pattern and the deductive method of teaching was associated with the direct classroom interaction pattern with respect to pupils with convergent and divergent creative problem solving styles;

ii. Since the inductive method of teaching was associated with the indirect influence of teacher on students, it increased pupil participation in the class in the form of percentage of pupil talk, teacher directed pupil participation, pupils' response in the form of description, inference and generalization.

e) Conclusions with respect to Process-Product Study

i. There was significant difference in the teaching process with respect to the percentage of time spent on different categories of classroom interaction, different areas of matrix and difference in interaction ratios associated with the inductive and deductive methods of teaching history.

ii. There was relationship between the significant difference in the achievement with respect to achievement in history, developing thinking operations and logical reasoning of pupils with convergent and divergent creative problem solving styles taught through the inductive and deductive methods of teaching and the corresponding significant difference in the teaching process.
5.11.0.0 Educational Implications of the Study:

The findings of the present research study, have implications for teacher educators, teachers, school administrators and for further research studies.

As mentioned in chapter one, a survey of the present conditions of teaching history as well as other social sciences in our classrooms has shown that the existing instructional objectives and strategies need to be improved. There needs to be a shift in the teaching of history from imparting mere knowledge of historical facts which leads to learning through rote memorization, to providing pupil participatory learning experiences. This change in the focus of teaching and learning of history is essential to prepare more enlightened, competent and committed democratic citizens for our country. To meet the challenges and requirements of our fast developing society, our students need to master the skills of logical reasoning, independent thinking, problem – solving as well as acquire the ability to assess situations objectively.

The present study has revealed that it is possible to achieve higher order cognitive and affective skills using inductive and deductive methods of teaching history. As found in the present study, the specially designed instructional material applying the inductive and deductive approaches based on the present history text books of Karnataka State at the secondary level, has been effective in developing thinking operations, reasoning skills and a positive attitude towards social and citizenship skills besides enhancing achievement. Based on the different findings of the present study the educational implications have been identified as listed below.

a. Teacher educators need to view the teaching of history from a new perspective. As the teaching of this subject is concerned, a shift from mere knowledge transmission, to developing of higher order cognitive and affective abilities such as thinking, reasoning, problem solving,
developing citizenship values, change in attitudes needs to be given the prime focus while training the student teachers for secondary schools;
b. The existing Methodology Curriculum at Teacher Education level needs to be restructured to suit the needs of teaching history at the school level in terms of improving the present instructional objectives and strategies;
c. A scrutiny of training strategies need to be developed to train teacher educators at Colleges of teacher education to orient the pre-service teachers in the improved methods of teaching;
d. In the present teacher education and school curriculum, more importance should be given to learner centred approaches with more scope for pupil involvement resulting in discovery of knowledge by the learner;
e. From the present study it was found that the teachers of history need to give importance to teaching processes related to the interaction patterns of Classroom behaviour such as indirect teacher talk, asking divergent questions and asking questions leading to guided discovery, to initiate pupil response and increase pupil participation in the form of inference and generalization. These behavioural patterns of pupils are closely related to thinking, reasoning and problem solving skills. In order to enhance achievement of pupils the teacher also needs to generate and maintain effective teaching process in the classroom. Hence the teaching of history and other social sciences needs to be both product and process oriented since these two factors are closely linked;
f. The present study provides empirical grounds for teaching different learners differently, specially based on their difference in learning styles, problem solving styles and other personality characteristics, in order to maximize their achievement;
g. It has been observed and studied that teaching learning process of social science takes place mostly within the classroom structure. In order to overcome this draw back as pointed out in the findings of the present
field study, the teachers of social science need to make use of activity aids and other modern audio-visual aids to make the teaching – learning process more dynamic;

h. Appropriate evaluation techniques need to be generated at school level to measure thinking and reasoning abilities of pupils;

i. As it is an urgent need, Colleges of Teacher Education (CTE) and District Institutes for Education and Training (DIET) should organise in-service programmes for teachers of social science in order to train them in using the Inductive Method of Teaching History.

5.12.0.0 Suggestions for Further Research:

The investigator hopes that the present study will encourage, stimulate and inspire further research studies in the area of teaching of history and other social sciences. Based on the present study a few suggestions are given below.

i. In the present study history was taught through the inductive and deductive methods. The same could be tried out for other social sciences to determine their comparative effectiveness and scope for application;

ii. In the present study fifteen topics from history content of standard nine text book were taught through the inductive and deductive methods. A research may be conducted wherein the full course of history from different text books, viz., from standard eight, nine and ten is taught using these methods and their effectiveness established for wider application and implementation;

iii. The inductive and deductive methods may be used in combination with other methods of teaching like inquiry method, problem solving method, to teach history as well as other social sciences. Thus, the appropriate sequence of different methods may be worked out and their effectiveness may be determined using different criteria;
iv. In the present study difference in creative problem solving styles of students was considered as a context variable. Other context variables such as intelligence, pre-achievement, aptitude, attitude towards different social sciences, socio-economic status, learning styles and grade level of students may be considered for studying the context-process and presage product relationships with respect to the inductive and deductive methods of teaching;

v. The effect of teaching history through the inductive and the deductive methods of teaching on developing attitudes of pupils towards this subject could be determined;

vi. The teaching processes associated with the inductive and the deductive methods of teaching were studied with respect to different groups of students. Similar teaching processes may be studied in relation to individual students, particularly to study their individual participation in the class;

vii. The thinking / reasoning processes involved in the inductive and deductive approaches to teaching may be studied from a psychological or sociological viewpoint;

viii. Both verbal and non-verbal interaction patterns with respect to teaching processes associated with the inductive and deductive methods of teaching history or other social sciences could be studied using suitable tools other than used for the present study;

ix. Relationship between achievement in history, acquisition of thinking and reasoning skills and attitude towards social and citizenship skills could be determined;

x. A comparison of the retention effects of teaching through the inductive and deductive methods could be made with respect to the learning outcomes in pupils after a fixed period of time;
xi. The study may be replicated to test the generalisability of the findings;

xii. The draft of the instructional material developed could be further validated for the use of pre-service and in-service teacher training programmes;

xiii. Instructional material consisting of examples and generalizations to teach through the inductive and deductive methods could be prepared in the form of multimedia packages after validating their usability;

xiv. Computer based tools may be developed and validated to individualize learning of history or other social sciences through the inductive and deductive approaches;

xv. Qualitative analysis of work sheets could be done;

xvi. A suitable curriculum could be evolved for nurturing thinking and reasoning abilities of Secondary School pupils;

xvii. Research needs to be conducted to generate evaluation techniques to measure thinking and reasoning abilities of pupils at school level;

xviii. Instructional material based on different school subjects may be prepared to develop thinking and reasoning abilities in elementary and secondary school pupils and the same could be validated.