SUMMARY
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INTRODUCTION

The World Bank Report ‘Knowledge for Development (1999)’ aptly remarks that the developing countries must strengthen the processes of acquiring knowledge, absorbing knowledge and communicating knowledge among their people in order to decrease the information gap between the developing societies and developed societies because in the present day world, knowledge is the most powerful means to development. This is so because in today’s world, economies are built not merely through the accumulation of physical capital and human skills, but on foundation of information, learning and adaptation.

Further, the knowledge which is key to growth and development of developing countries depends largely on different types of thinking such as convergent / scientific thinking and divergent / creative thinking and their development. These in turn depend on thinking styles of the individual learners. Thinking styles are preferred ways of exploiting thinking abilities. This way, one may conclude that understanding, development and application of variety of thinking styles of individuals go a long way in all round development of the nation.

Moreover, many of the students we are consigning to the dust heaps of our classrooms, have the abilities to succeed. It is the teachers, not they (students) who are failing. Indeed teachers are failing to recognize the variety of thinking and learning styles they (Students) bring to the classrooms and reaching them in ways that don’t fit them. Therefore, Sternberg (1997) very rightly suggested the educational implication stemming from the convergent-divergent thinking styles are far reaching. Convergent thinking styles are considered most conducive for sciences, maths and teaching and divergent thinking styles for arts.
Hudson (1966) has found that in general individual with convergent thinking styles prefer formal problems and tasks that are better structural and demand greater logical ability than the more open-ended problems forwarded by divergers. Convergers apparently that we need to take into account student’s styles of thinking if we hope to reach them, especially in teaching. Thus situation warrants that investigations be carried out on thinking style of students.

STATEMENT OF THE PROBLEM

In the past several years, there has been extensive research on various approaches to college teaching. But no one approach or method has been found to be consistently superior to all others. However that may only be showing that no one approach is superior for the mythical average students. The more important question is to determine which student learn best under what conditions. An emerging area of research that holds promise in helping us answer this question is student’s styles of learning and thinking.

It is amply evident from the foregoing presentations that the research area of styles of thinking is new one particularly for Indian researchers. There are several variables, which need to be investigated in relation to thinking styles of college students. Significant among them are academic achievement, gender, academic discipline/stream, motivation and personality type. The proposed study has been designed to address the following research question –

i. Are there significant differences in styles of thinking of college students having varying levels of academic achievement. i.e. high, average and low?

ii. Are there significant gender differences in the styles of thinking of college students?
iii. Do college students belonging to science, arts and commerce streams exhibit significant differences in their styles of thinking?

iv. Do significant differences exist in styles of thinking of college students having different types of personality?

v. Do college students with high and low levels of Intrinsic’ and ‘Extrinsic’ motivations show significant differences in their styles of thinking?

The above research questions are the integral part of the research problem. Thus the problem of the study was stated as follows:

“A STUDY OF THINKING STYLES OF COLLEGE STUDENTS IN RELATION TO SELECTED COGNITIVE AND NON-COGNITIVE FACTORS”

NEED AND JUSTIFICATION OF THE STUDY

Educators hold that students learn and think in unique individualized ways whether they belong to school, college or university level. Post-secondary education or higher education is becoming increasingly important in every society of developed or developing countries. Particularly a society of people who make mid life career changes or advance their skills or who must work out of necessity or those whose leisure time permit higher education, all contribute to increase demand of higher education through formal or non-formal modes. Therefore the question of how to teach college level students in more effective and efficient ways is becoming pertinent day-by-day.

In search of solution of teaching problems college students, some work has been done on thinking styles of students in foreign countries. But in India no such attempt has been made so far. Hence there is a considerable scope to probe the area styles of thinking of college students in socio-cultural milieu of Indian society.
Thinking styles are very important components of the learning processes of college education. Their understanding is highly desirable if we have to obtain a comprehensive picture of learning processes of college students and to base our teaching efforts on the knowledge of the same in order to inject quality control in educational process.

In view of the above, the need of the proposed study is vividly clear and the study was quite justified to undertake.

**OBJECTIVES**

The following objectives were realized in the proposed study –

1. To find out the differences in thinking styles of college students in relation to their academic achievement.
2. To Study the differences in thinking styles of college students in relation to their gender.
3. To Study the differences in thinking styles of college students belonging to science, arts and commerce streams.
4. To find out the differences in thinking styles of college students in relation to their personality types.
5. To find out the differences in thinking styles of college students in relation to their motivational orientations.

**HYPOTHESES**

The following hypotheses have been tested in the proposed study:

1. There will be significant differences in thinking styles of college students having high, average and low levels of academic achievement.
2. There will be significant differences in thinking styles of male and female college students.
3. There will be significant differences in thinking styles of college students belonging to science, arts and commerce streams.
4. There will be significant differences in thinking styles of college students having:
   
   (a) extrovert type and introvert type personality and
   
   (b) neurotic type and stable type personality.

5. There will be significant differences in thinking styles of college students having high and low levels of motivational orientations Viz.
   
   (a) high and low levels of intrinsic motivation and
   
   (b) high and low levels of extrinsic motivation.

However, for the sake of convenience of testing each hypothesis was into specific hypotheses based on thinking styles.

**SCOPE AND DELIMITATIONS**

Scope and delimitations of the present study may be understood in terms of the objectives, hypotheses, research method, population sampling, variables, tools, and statistical technique etc.

➢ The study was delimited in terms of its objectives. These objectives were concerned with determining the differences in thinking styles in relation to college student’s cognitive and non-cognitive characteristics.

➢ Cognitive characteristic was academic achievement and non cognitive characteristics were gender, stream, personality type and motivational orientation.

➢ The study was concerned with testing of non-directional research hypotheses.

➢ The study was carried out through descriptive methods of research.

➢ The population of the study comprised college students of final year studying in science, arts and commerce streams.
The sample was drawn from the colleges of Jhansi only. It included both - govt. managed and privately managed institutions. The sample included subjects of both sexes.

Institutions were, selected through random method but the sample was drawn through random cluster sampling technique.

The study was further delimited in terms of variables. Academic achievement, gender, stream, personality type and motivational orientation (intrinsic and extrinsic) were regarded Independent variables. Thinking styles were treated as Criterion variables.

The data were collected with the help of Torrance et.al’s SOLAT, Sternberg et.al’s Thinking Style Inventory, Eysenck’s MPI and Ambile et al’s Work Preference Inventory. Academic Achievements marks were noted from gazette.

Subjects were classified by using M ± 1 SD formula on academic achievement, personality type (Extraversion and Neuroticism) and motivation orientation (Intrinsic and Extrinsic).

The data on criterion variables were analyzed by ‘t’ test and one-way Analysis of variance technique. Post-hoc analysis was done again by ‘t’ test. Graphs were used to depict differences in mean scores of thinking styles in respect of various groups.

The study was delimited in terms of time and financial resources also.

DEFINITION OF THE KEY TERMS USED

The key terms which have been used frequently in the present study have been defined here to bring precision and clarity:

**Thinking Style:** Refers the way one thinks or prefers to think using particular cerebral hemisphere or mental ability.

**Left Hemispheric Style:** Refers to inclination to use the left cerebral hemisphere in information processing.
Right Hemispheric Style: Refers to inclination to use the right cerebral hemisphere in information processing.

Integrative Style: Refers to inclination to make use of capabilities of both cerebral hemispheres in information processing.

Legislative Style: Person with this style is concerned with creating, formulating imaging and planning; likes to formulate his/her own activities.

Executive Style: Person with this style is concerned with implementing and doing, likes to pursue activities structured by others.

Judicial Style: Person with this style is concerned judging, evaluating and comparing; likes to judge the products of others' activities, or to judge the others themselves.

Monarchic Style: Person with this style tends to focus single-mindedly on one goal or need at a time a single goal or way of doing things predominates.

Hierarchic Style: Person tends to allow for multiple goals, each of which may have a different priority; knows how to perform multiple asks within the same time frame, setting priorities for getting them done.

Oligarchic Style: Person with this style tends to allow for multiple all of which are equally important: likes to do multiple tasks the same time frame but has difficulty setting priorities for them done.

Anarchic Style: Person with this style tends to eschew rules, procedures and formal systems; often has difficulty adjusting to school as a system.

Global Style: Person with this style prefers to deal with the large picture and abstractions.

Local Style: Person with this style prefers to deal with details and issues.

Liberal Style: Person with this style likes to do things in new ways, to have change in his/her life, and to defy conventions.
Conservative Style: Person with this style likes traditions and stability; prefers doing things in tried and true ways.

Personality Type: Refers to type of personality based on two dimensions as measured by MPI of Eysenck e.g. extroversive and introversive, neurotic and stable types.

Extrovert (Extroversive) Type: Refers to type of personality, which is least centered around shyness and withdrawal and is more social Introvert (Introversive) Type: Refers to type of personality which is shyness and withdrawal centered.

Neurotic Type: Refers to the general emotional liability of a person, his emotional over responsiveness and his liability to neurotic break down under stress.

Stable Type: Refers to neurotic stability under stress.

Motivation Orientation: Refers to preference for intrinsic and extrinsic motivation as measured by Student Work Preference Inventory of Amabile et al.

Non-Cognitive Characteristic: Refers to academic achievement of students.

Non-Cognitive Characteristic: Refers to gender stream, personality type and motivational orientation.

METHOD OF RESEARCH

The present study's prime concern was to ascertain the differences in thinking styles of college students in relation to achievement, gender, stream, personality type and motivational orientation. Thus the nature of the study required descriptive analysis of existing thinking styles of college students. For this purpose, neither historical, philosophical, case study nor the experimental research was suitable. Only normative survey, under the descriptive research could serve the purpose of the present investigation.
POPULATION

The population of this study included all the students studying in IIIrd year of science, arts and commerce in all the colleges of Jhansi city. It included students of government and aided colleges.

SAMPLE

The sample consisted of 371 students. Out of this 193 belong to science, 106 belong to arts and 72 belong to commerce stream. Further 198 students were male and 173 were female.

The sample was drawn by random cluster method. However selection of the institutions was made by random sampling technique.

VARIABLES INVOLVED

In the presented study, two types of variables were considered:

(i) Independent and

(ii) Criterion variables

Independent variables are the conditions or characteristics that the experimenter manipulates or controls in his or her attempt to ascertain their relationship to observe phenomena. In the present study one cognitive characteristics - academic achievement and four non-cognitive characteristics namely gender, stream, personality type and motivational orientation were the independent variables. These were used for classifications of the subjects.

Criterion variables are those characteristics of the learner on which comparisons are made. Under this category sixteen thinking styles were included. Criterion variables are also referred to as dependent variables, which are conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variables.
TOOLS USED

In the present study the following tools were employed for data collection:

- Your Style of Learning and Thinking (by Torrance et al.)
- Thinking Style Inventory (by Sternberg and Wagner)
- Maudsley Personality Inventory (M P I) (by Eysenck)
- The Student Work Preference Inventory (by Ambile)

STATISTICAL TECHNIQUES

The data were analyzed by one-way analysis of variance and ‘t’ test. The post hoc analysis in case of significant F-ratio was done by ‘t’ test.

CONCLUSIONS

The following conclusions were drawn in the preceding chapters:

THINKING STYLES IN RELATION TO ACADEMIC ACHIEVEMENT

College students differed significantly only on two thinking styles (Right and Local Hemispheric style) in relation to their academic achievement. Low achievers were significantly more right hemispheric oriented than high achievers. Also high achievers had significantly more inclination towards local style of thinking than average and low achievers.

On rest of the thinking styles viz, left hemispheric, integrated, legislative, executive, judicial, monarchic, hierarchic, oligarchic, anarchic, global, internal, external, liberal and conservative no significant differences were found.

THINKING STYLES IN RELATION TO GENDER

Male and female students differed significantly in one thinking style only i.e. executive style. Female students tended to be more executive than male students in their style of thinking.
On remaining styles no significant differences between male and female students were observed. These styles were - left hemispheric, right hemispheric, integrated, legislative, judicial, monarchic, hierarchic, oligarchic, anarchic, global, local, internal, external, liberal and conservative.

THINKING STYLES IN RELATION TO STREAMS

Students belonging to science, arts and commerce streams differed significantly in few styles of thinking. Science students were more left hemispheric dominated, more legislative, more local and more external than students belonging to arts and commerce streams. Arts students were more right hemispheric oriented as compared to science and commerce students.

On rest of thinking styles viz, integrated, executive, judicial, monarchic, hierarchic, oligarchic, anarchic, global, internal, liberal and conservative, no significant differences were found among students of science, arts and commerce streams.

THINKING STYLES IN RELATION TO PERSONALITY TYPE (INTROVERT AND EXTROVERT)

Extrovert and introvert type of students did exhibit significant differences in their two thinking styles only viz, left hemispheric and right hemispheric style. Introvert students were more left hemispheric in their thinking style than extrovert type of students. While extrovert students were more right hemispheric in their thinking styles than introvert students.

On rest of the thinking styles namely - integrated, legislative, executive, judicial, monarchic, hierarchic, oligarchic, anarchic, global, local, internal, external, liberal and conservative no significant differences were observed between students having extrovert and introvert type of personality.
THINKING STYLES IN RELATION TO PERSONALITY TYPE  
(NEUROTIC AND STABLE)

The neurotic and stable type of students differed significantly in one thinking style i.e. executive style. Neurotic type students were found to be higher executive than stable type of students.

On remaining thinking styles viz, left, hemispheric, right hemispheric, integrated, legislative, judicial, monarchic, hierarchic, oligarchic, anarchic, global, local, internal, external, liberal and conservative no significant differences were found between neurotic and stable type of students.

THINKING STYLES IN RELATION TO INTRINSIC MOTIVATION

College students exhibited significant difference in two thinking styles (oligarchic and anarchic) in relation to intrinsic motivation. Low intrinsic motivation group of students obtained significantly higher mean scores on oligarchic and anarchic styles of thinking in comparison to the high intrinsic motivation group of students.

On the remaining thinking styles i.e. left hemispheric, right hemispheric, integrated, legislative, executive, judicial, monarchic, hierarchic, global, local, internal, external, liberal and conservative, no differences were found between high and low intrinsically motivated students.

THINKING STYLES IN RELATION TO EXTRINSIC MOTIVATION

College students differed significantly only in one thinking style i.e. external in relation to extrinsic motivation. Low extrinsic motivation group of students tended to be using more external style of thinking than high extrinsic motivation group of students.

On rest. of the thinking styles namely - left hemispheric, right hemispheric, integrated, legislative, executive, judicial, monarchic,
hierarchic, oligarchic, anarchic, global, local, internal, liberal and conservative no differences were observed between high and low intrinsically motivated students.

**EDUCATIONAL IMPLICATIONS OF FINDINGS**

On the basis of findings of the study, the following implications may be drawn for higher education.

The findings show that the academic achievement of students is linked with their thinking styles. High achieving students were more local than average and low achieving students. While low achieving students were more prone to right hemispheric style of thinking. Thus it suggests that educational administrators may do some thing to improve the student’s achievement by properly diagnosing the factors, which hinders the achievement of students.

Female students were found more executive than male students in their thinking style. This fact may be used by educational planners for various developments.

Stream has vital links with thinking styles of students. Science students were found more left style oriented, more legislative, more local and more external than arts and commerce students. This underlying fact may be used by educational counselors for guiding the students in proper fields for the proper development of their talent.

Thinking styles also have effect on the extrovert and introvert type of personalities of the students. This fact may thus be considered by the teachers inside and outside classroom situations for modifying the student’s personality.

Thinking styles also bear a relationship with neurotic and stable type of students. Neurotic students are found more executive than stable type of students. Psychologists may thus consider this fact for helping the students to improve upon their personalities for overall development.
Thinking style is found to have a vital link with both type of motivation viz, intrinsic motivation and extrinsic motivation. Students with low intrinsic motivation were found to be more oligarchic and anarchic than students with high intrinsic motivation. While students having low extrinsic motivation were found to be more external in their thinking style than the students possessing high extrinsic motivation.

It may thus be inferred that by considering the above facts, intervention strategies may be employed in order to enhance the development of desired thinking styles among college students.

Classroom transactions, curriculum framing, assignment designing may be based on thinking styles of college students so that diversity in thinking styles of college students may be properly exploited for their development.

SUGGESTIONS FOR FURTHER RESEARCH

After having intensive and extensive experience of conducting the present study, the investigator feels that other researchers may undertake the investigations on the following lines:

1. A study may be designed to investigate their gender differences in thinking styles of college and university students by employing some inventories of thinking styles, which have not been used in the present study.

2. An investigation may be undertaken to explore the relationship of thinking styles of college students by using Cattell’s sixteen personality questionnaire.

3. The relationship of thinking styles of college students may be studied with their personality needs.

4. An investigation may be taken up to compare the thinking styles of college students belonging to professional courses.
5. Thinking styles of college students may be studied across different levels of academic achievement.

6. A cross-cultural study may be designed of thinking styles of college students.

7. Thinking styles of college students may be inquired into as a function of intelligence and creativity.

8. A study may be planned to find out the differences in thinking styles of college students in relation to self-concept, self-confidence and anxiety levels.

9. A comparative study may be undertaken of thinking styles of college students coming from different disadvantaged sections of the society.

10. A study may be undertaken with a view to find out the differences in thinking styles of intellectually, creativity and academically talented college students.

11. A comparative analysis may be done of thinking styles of well-adjusted and mal-adjusted college students.

12. Thinking styles of college students may be studied in relation to their background factors.

13. The relationship between thinking styles of college students and thinking styles of college teachers may be studied.

14. A study may be designed to investigate the interaction between thinking styles of college students and teaching strategies used at college level.

15. A study may be taken up to explore the relationship between thinking styles of college students and quality of intellectual performance.
16. Thinking styles of college students may be studied in relation to level of dogmatism.

17. A Predictive study of thinking styles may be taken up based on gender, culture and inhabitance of college students.

18. Thinking styles of college students may be explored in relation to different types of creativity viz. musical, artistic, linguistic and mathematical.