EFFECTIVENESS OF MIND MAPPING STRATEGY FOR TEACHING SOCIAL SCIENCE AT HIGH SCHOOL LEVEL IN TERMS OF ACHIEVEMENT, ATTENTION, MEMORY AND REACTION

PRE- PRESENTATION SUMMARY

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SUMMARY

1.0.0 INTRODUCTION –

The present study entitled "Effectiveness of Mind Mapping Strategy for Teaching Social Science at High School level in terms of Achievement, Attention, Memory and Reaction". This study belongs to the area of instructional design technology. The main aim of the study was to check effectiveness.

The Mind Maps were prepared from selected chapters of social science subject of class 9th M.P. board curriculum. In the present chapter, details about Mind Mapping, History of Mind Mapping, Characteristics of Mind Mapping, Advantages of Mind Mapping, Differences between Mind Mapping and Concept Mapping, Rationale, Statement of Problem, Objectives, Hypotheses and Delimitations are given in separate captions.

1.1.0 BACKGROUND OF THE PROBLEM / STUDY

At the secondary level of schooling system, social science subject is partitioned or comprise element of sub-subjects like history, political science, geography and economics. These sub subjects have enormous information, facts that are very elaborative in nature, hence students find it hard to maintain same level of interest in studying. It tends to have broad concepts, lots of factual information, dates and yearly phenomenon that are supposed to be remembered. It is the big challenge for students and teachers too. So that social science teaching must adopt new strategies and methods that promote or increase creativity, problem solving and that should be in a visually captivating manner including pictures, colorful diagrams, maps which makes teaching and learning more effective and interesting, visualization of concept that clarify the subject matter to the students by adopting the constructivist type approach of teaching.

Secondary school students actively participate in those subjects in which different interesting teaching and learning methods and techniques are used, but in social science subject many teachers have faced difficulties in delivering their course content effectively. They still continue to use traditional teaching methods. In a traditional teaching method teacher passively transfers the

knowledge and instructions to students, so most of the students have poor track record and achievement in social science subject.

To eliminate above stated problem, it is needed to change the transaction strategy, give opportunities of interaction, learning by doing, build their understanding of subject and ensuring a learner-centered academic environment. According to the constructivist perspective, learning is a process through which learners actively engage and build their knowledge stronger by connecting concepts, ideas, keywords, links and associations for a significant integration. For putting this into work, using strategies to acquire student's attention, interest and involvement, encouraging active and meaningful learning by some efficient ways.

Mind mapping strategy can be a solution of these problems, because mind mapping is the visual pictorial technique that develop a comprehensive understanding of the concept in non-linear structure. Mind mapping strategy grabs attention by usage of links, key words and phrases. Images, coloured branches that connects ideas, which make associations of prior knowledge and better assimilations, and relationship of new information, this technique makes way for deep learning of a concept or idea, it is an effective study technique **(Farrand, Hussein and Hennessey 2002).**

It is a modality, which develops thinking skill, activate imagination, and understand relationship between different aspects of a concept. Mind mapping can be a powerful tool to help students to develop cognition skills; with this strategy, they can organize information with the visual presentation in a holistic manner, which increases the mental flexibility.. Mind maps can help student to record information in a structured way, it enhance learning and creativity that can make learning more enjoyable.

1.1.1 MEANING OF MIND MAP:

Mind maps are association maps. Mind maps can be used to explain concepts in an innovative way. They are quicker to make and much easier to remember and review due to their visual quality. By presenting ideas in a radial, graphical, non-linear manner. Mind Maps encourage an unorthodox brainstorming approach that can generate ideas without regard for a more formal, hierarchical organization system. This helps to make associations easily, add more information even after drawing Mind Map. The elements of a given Mind Map are arranged intuitively according to the importance of the concepts and are classified into groups, branches or areas, with the goal of representing semantic or other connections between portions of information.

Mind mapping is a creativity and productivity-enhancing technique that can improve the learning and efficiency of students and organizations. It is a revolutionary system for capturing ideas

and insights horizontally on paper. "It can be used in nearly every activity where thought, planning, recall or creativity are involved" (Buzan, 1989).

1.1.2 DEFINITION OF MIND MAP: -

The mind mapping is defined as;

- **According Buzan (1989)**:- Mind mapping has been defined as visual, non-linear representations of ideas and their relationships, Mind maps comprise a network of connected and related concepts. However, in mind mapping any idea can be connected to any other. Free-form, spontaneous thinking is required when creating a mind map and the aim of mind mapping is to find creative associations between ideas.

- **On 1989 Buzan** suggests mind maps have a central concept from which a "main word" is selected, around each word, thus creating a network of concepts around the main word. It is a tool primarily used for stimulating thought.

- **Tony Buzan(1997)** has defined mind map as "a diagram used to represent words, ideas, tasks, or other items linked to and arranged radically around a central key word or idea. It is used to generate, visualize, structure and classify ideas and as an aid in study, organization, problem solving, decision making, and writing." He used a two-dimensional structure, instead of the list format conventionally used to understand and take notes.

- **Buzan (2002)**:- mind mapping is a graphic representation of ideas. It shows the ideas which are generated around a central theme and how they are interlinked. Mind mapping represents a powerful aid for stimulating whole brain thinking. It engages the often-inactive right hemisphere of the brain by emphasizing spatial and visual language.

- **According to Alamsyah (2009)** Mind Mapping is a useful technique to learn more effectively improves the way to record information supports and enhances creative problem solving.

For the **present research** mind mapping is defined as "mind mapping is a graphical and pictorial representation of ideas, concepts and terms. It is a technique to teach and learn more effectively. It is used to understand, visualize, generate structure, classify and association of ideas and it is as an aid in study''.

1.1.3 MIND MAPPING STRATEGY:

The strategies promoting activities that involve students in doing things and thinking about what they are doing can be implemented in the classrooms. Mind mapping is a very powerful tool for brainstorming, creative thinking, problem solving, organizing of ideas and of course, note taking. It is an innovative strategy enabling the practitioner to organize information and perceptions. In such a ways Mind Map, allow them to achieve results that were once inconceivable.

Mind Mapping is a **pedagogical technique** it can improve the learning and efficiency of individuals. Mind Mapping is a graphics-based method of taking notes,

- ❖ It is not only show facts but also the overall structure of a subject and the relative importance of individual parts.
- ❖ It helps students to memorize take attention and enhance logical reasoning, associate ideas and make connections.
- ❖ This can explore almost any Topics in broad outline; a learner's knowledge structure gets visible by means of mind maps for both the teacher and learner.
- ❖ This is presenting ideas on the board, decorating and developing the visual capacities, the ability to produce simple images as visuals can condense extensive amounts of information.

1.2.0 RATIONALE OF THE STUDY:

In the present scenario the basic question of Instructional Technology is how to deliver instructions effectively, large numbers of researches have been conducted and various teaching and learning strategies are proposed to answer this question. For cognitive development of the students, changes in the teaching strategy is needed, so that the students can apply knowledge in their real life situation. According to cognitivist theory of psychology, said that how the mind focuses and the mind receives, processes, organizes, stores, and retrieves information. Mind Mapping also helps the students to develop, encourage, make association, retain and present the knowledge in semantic or graphical approach. Apart from this the mind mapping can be used in teaching, learning, planning of various disciplines such as arts, commerce, science, medical and engineering etc. It is also used to generate, visualize, structure and classify ideas, and as an aid in teaching learning process. Mind Mapping is a pedagogical technique which improves the learning and efficiency of individuals. It can be used in almost every activity where thought, recall or creativity is involved (Tony Buzan 1989). Therefore, it is beneficial to use mind mapping as pedagogical techniques so, the researcher has selected this strategy. Mind mapping help the teacher to teach in an innovative way the broad

concepts, facts, figures etc. and it can help the learner to learn and understand the concepts which will retain in their mind permanently.

According to National Curriculum Framework 2005, it describes the structure of knowledge as a set of proposition comprising of concepts, for knowledge construction students have to give freedom to creative thinking about concept and giving liberty to make associations and connections in concepts.

Various approaches, strategies, method are applied to elicit students understanding and they are helpful for teachers. One of the important such strategy is mind mapping strategy. During review of related literature researcher has found very few study carried out in the field of Mind Mapping strategy, these are **Karolina Karolina (2019)** conducted a study on **Effectiveness** of Mind Mapping Technique in Enhancing Students Reading Achievement. Sample was tenth grade students at SMAN 2 Kuala Kapuas, Central Kalimantan intending to acknowledge the degree of enhancement in their reading achievement through mind mapping technique. For high school students, One experimental and one control group was involved as per quasi-experimental research structure having students' achievement as dependent variable and mind mapping technique as independent variable. Mind mapping technique was found to be effective in strengthening students reading achievement. **Bharambe,(2012), Parimala fathima, Sasikumar, and Panimalarroja, (2012), Mani, (2011), Bilim(2012), Koonce(2012), Riswanto & Prandika(2012), Ozgul(2012) Beel and Langer(2011), Al-Jarf (2011), Thangarajathi (2008), Ammam(2008), Genovese(2008), Akinoglu, and Yasar(2007), Budd (2007), Cunningham, Glennis(2006), Polsen(2003), Paykoç, Mengi, Kamay, Onkol, Ozgur, Pilli, and Yildirim (2004), Evrekli, Didem, and Balim(2010)**.

Some studies carried out in different subjects, **Wahyu(2019), Karolina Karolina (2019) ,Toi (June 2009), Bilim (2012), Afaf M. Aljaser (2017), Mohmaud (2018) Wilson(2016), Poorana (2013) Ivana(2013) Yumusak, (2013). Vijayakumari, K & Kavthhamole, M.G (2014), Isil Tanriseven (2014) Bhushan (2008),Gemma Boyson (2009) Harkirat, Dhinds, Makarimi, Kasim & Anderson (2010), Christina & Paxman (2011), Wickramasingle, A.(2011),Ozgul (2012) ,Mani, A. (2011) ,Johannes Wheeldon (2011), Carter (2008), Valarmathi, K. E. (2011), Lavoie (1997) Mona, A., & Fouad, A. (2008),Akinoglu and Yasar (2007) A. Seyihoglu & Ayca Kartal (2010)., Margulies (1991**) from the review of related literature it was found that Mind Mapping Strategy have been used with many subjects maths, science, physics, life science etc.

Some studies were conducted with constructivist approach with mind mapping, **Bhushan (2008)**, has proposed collaborative e-learning platform designed to enhance the online learning of diplomacy. **Gemma Boyson (2009)** study on title 'The use of Mind Mapping in Teaching and Learning. They would use Mind Mapping for revision and more than 75% of respondents said they would like to use Mind Maps in other subjects. Results showed that Mind Mapping increased the understanding of the module objective and increased recall of the subject matter. More than 80% of students agreed that Mind Mapping might help them to remember information and 72% of students agreed that Mind Mapping helped them to know how each topic fits into a subject

Some studies has conducted on different mind map techniques study titled "The views of the teachers about **Harkirat, Dhinds, Makarimi, Kasim & Anderson (2010),** conducted study on constructivist-visual Mind Map Teaching Approach and the quality of students cognitive structures. **Mani, A. (2011)** conducted a study on "the effects of digital mind mapping over paper based mind mapping and conventional teaching method on students' achievement in Environmental Science". Result indicated that most of the students were satisfied using mind mapping to learn Environment Science and also indicated that Digital mind mapping produced the best outcomes, especially in the activities like brainstorming and group discussion. **Johannes Wheeldon (2011),** conducted research to study the facilitation of participant recall using Mind Maps. In this study they themselves provided some useful reflections on the utility of mind maps in this project. They described maps as "useful way to see, experience", "easy to compile", "new way to see the system of the project", "helped them to remember events from years ago", "organize their thoughts about the experience systematically", etc **Plotnick (2008)** focuses on the importance on Mead Map-Mind Mapping for students. **Cynthia (2005)** Conducted study on mind mapping and outlining: comparing two types of graphic organizers for learning seventh-grade life science result found that the significant difference existed for students who used the outlining strategy to answer unit test questions on cellular biology when compared to the control and mind-mapping groups.**Holland, Holland and Davies (2004)** has study on "An investigation into the concept of Mind Mapping and the use of Mind Mapping software to support and improve student academic performance" The project was very successful as the technique proved useful in helping the students improve the structure, coherence and therefore the quality of their written work. students' perceptions on the effectiveness of the Mind Mapping technique and software. **Keith Polsen (2003**) has been working towards the concept of Mind Mapping in learning and teaching pupil and teaching perspectives. The result this research

offers practitioners evidence-based insights into a previously under-explored learning method, identifying many benefits and potential classroom uses. **Goodnough, K. & Long, R. (May, 2002)** titled 'Mind Mapping: A graphic organizer for the pedagogical toolbox' studied 16 sixth grade students with mixed academic ability for a single Science unit. The results showed that the use of coloured markers helped to enhance memory as students could make connections amongst ideas. Thus mind maps cater to both the verbal-linguistic and visual-spatial intelligences through its combination of graphics, symbols and text.

Reviewed from the above studies it can be concluded that there are lots of studies related to different variable like Achievement, self-regulation, but on Attention only one **Christina & Paxman (2011**) in their study titled "Mind Maps: Your Way to Speech Success" drew attention towards using mind maps as a speech preparation technique. For this, the students were first familiarised with mind mapping concept and the underlying principle of this activity. For thorough understanding and instructing students how to engage in the technique, teachers were motivated to provide students with mind mapping examples and video clips, from the discussion among students on the concept of mind mapping, it was observed that colourful text and symbols from textbooks and PowerPoint presentations enabled them to perform better and for them mind map technique worked the same way as they were created highlighting large amount of information using symbols and colours.

Some studies found on Memory and recall **Irman (2019), D. Anthony, Genevieve Pinto Zipp, Valerie G Olson, Terrence F Cahill (2010), and Toi (June 2009),** Research on How Mind Map improves Memory" explored the difference in children's recall ability, the researcher found that although children from both groups demonstrated increased level of memory and recollection of those thirty words but experimental group was found to be better at memorising by thirty two percent. **Johannes Wheeldon (2011)**, Farrand, Hussain and Hennessy (2002).

From above studies it can be concluded that there are lots of studies related to the field of mind mapping strategy with different subjects like biology, physics, life science, environment and different psychological variables, at different levels like primary, secondary, higher secondary and at university level also, but with social science subject only three studies **Parikh(2016), A. Seyihoglu & Kartal (2010),** Keith Polsen (2003), were found. Hence, a gap was spotted and researcher found a need to study the effectiveness of mind mapping strategy in social science subject with different variables like achievement, attention and memory of high school students. So due to all these reason researcher has selected the present research.

1.3.0 STATEMENT OF PROBLEM

"Effectiveness of Mind Mapping Strategy for Teaching Social Science at High School Level in Terms of Achievement, Attention, Memory and Reaction"

1.4.0 OPERATIONAL DEFINITIONS

1. Achievement: Achievement means a measure of knowledge gained in social science subject by mind mapping strategy, it is indicated by criterion reference test scores.

2. Attention: Attention is an obvious responses on the basis of notice or focus towards the series of visual stimulus presented to them through power point slide.

3. Memory: Memory is characteristics of living organism. It involves reviving or reliving of past experience with more or less definite realization that the present experience is a revival of past experience. when we perceive an event and subsequently recall our experience after an interval of item we call it our memory.

4. Reaction: Reaction is the responses of experimental group students towards the mind mapping strategy.

1.5.0 OBJECTIVES OF THE STUDY:

The following objectives are decided for present research work

1. To compare the pre and post mean Achievement scores of students taught through mind mapping strategy.

2. To compare the pre and post mean Attention scores of students taught through mind mapping strategy.

3. To compare the pre and post mean Memory scores of students taught through mind mapping strategy.

4. To study the effect of Treatment, Gender and their Interaction on Achievement of high school students in social science subject when Pre Achievement is taken as covariate.

5. To study the effect of Treatment, Gender and their Interaction on Attention of high school student when Pre Attention is taken as covariate.

6. To study the effect of Treatment, Gender and their Interaction on Memory of high school student when Pre Memory is taken as covariate.

7. To study the effect of Treatment, Types of School and their interaction on Achievement of high school students in social science when Pre Achievement is taken as covariate.

8. To study the effect of Treatment, Types of School, and their Interaction on Attention of high school students when Pre Attention is taken as covariate.

9. To study the effect of Treatment, Types of School and their interaction on Memory of high school students when Pre Memory is taken as covariate.

10. To study the reaction of experimental group students towards the mind mapping strategy.

1.6.0 HYPOTHESES

The hypotheses of present study are:

1. There is no significant difference in the pre and post mean Achievement scores of high school students taught through mind mapping strategy.

2. There is no significant difference in the pre and post mean Memory scores of high school students taught through mind mapping strategy.

3. There is no significant difference in the pre and post mean Attention scores of students taught through mind mapping strategy.

4. There is no significant effect of Treatment, Gender and their interaction on Achievement of high school students in social science subject when Pre Achievement taken as covariate

5. There is no significant effect of Treatment, Gender and their interaction on Attention of high school student when Pre Attention is taken as covariate.

6. There is no significant effect of Treatment, Gender and their interaction on Memory of high school student when Pre Memory is taken as covariate.

7. There is no significant effect of Treatment Types of School and their interaction on Achievement of high school students in social science when Pre Achievement is taken as covariate.

8. There is no significant effect of Treatment, Types of School and their Interaction on Attention of high school students when Pre Attention is taken as covariate.

9. There is no significant effect of Treatment, Types of School and their interaction on Memory of high school students when Pre Memory is taken as covariate.

1.7.0 DELIMITATIONS

The delimitation of the study were as fallows;

1. The study was conducted in Indore city only.

2. In this study population comprised only class IX students of M.P. Board of Secondary Education.

3. Only the students of Hindi Medium School were selected for the sample.

4. Mind mapping strategy were used for the study.

5. Mind Maps were constructed based on selected chapters of social science for class IX Text book Mind Maps were constructed in Hindi language only.

6. The Attention tool used in the research was developed and standardized by researcher.

7. The study comprised of Achievement, Attention, and Memory as dependent variables, and Mind Mapping Strategy, Gender and Type of School as independent variable

1.8.0 SAMPLE

The present study was experimental in nature and conducted in two stages first one is for attention tool development and in the second stage experiment was conducted.

1.9.1 SAMPLE FOR TRY OUT STAG AND TOOL DEVELOPMENT

The sample used for tryout stage for tool development and experimental stage were different but population selected was same that is students of Board of Secondary Education M.P. Bhopal, affiliated government and private schools of Indore city.

For tool development total 158 students from five M.P. board affiliated Higher Secondary Schools of Indore city were selected. There were, Govt. Higher secondary school, bhicholi mardana, Parijat Higher secondary school, Vikas vidhya niketan, Vardhaman Higher Secondary School, Seventh day higher secondary school of Indore City of the session 2021-2022. The school wise and gender wise sample distribution is that the size of sample at tryout stage was 158. The detail are given below in the table 1.1,

Table 1.1 The school wise and gender wise distribution of sample for Tryout stage

S.No	Name of School	Gender		Total
		Male	Female	
1	Govt. H. S. School, Bhicholi Mardana,Indore	34	33	67
2	Vardhaman H. S.School, Indore.	12	11	23
3	Parijat H.S. School, Indore.	05	08	13
4	Vikas Vidya Niketan H.S. School, Indore.	16	23	39
5	Seventh Day H.S. School, Indore.	08	08	16
	Total	**75**	**83**	**158**

Table 1.1, shows that the size of sample at tryout stage was 158. The 67 students from Govt H.S. school Bhicholi Mardana, 23 students from Vardhman H.S. School, 13 from Parijat H. S. School, and 39 students from Vikas vidhya niketan, 16 students from seventh day H.S. School. Gender wise the sample composed of 83 girls and 75 boys. They are studied in class 9 th, the range of their age group was from 13 years to 17 years. They were able to understand, read and write Hindi language properly.

1.10.2 SAMPLE FOR EXPERIMENTAL STAGE

The sample for this stage was 235 Ninth class students of Board of Secondary Education M.P. Bhopal, affiliated Seven schools were selected purposively, the out of 7 schools 4 were government and 3 were private schools and out of four government school two were boys and two were girls only,

While out of 3 private school, one boys school, one girls school only and one private school is co-ad in nature. The Experimental group had 125 students and 110 students were in control group, no changes were made in composition of the above mentioned groups. Control group was delivered lessons by traditional approach by their teachers and experimental group was taught with mind mapping strategy.

Three school were selected for treatment with mind mapping strategy and four schools were selected as traditional group. For assigning treatment the sections in three schools were randomly selected. Named that Malhar Ashram Govt. Multipurpose Higher Secondary School, Shaskiya Sharada Kanya Higher Secondary School, M.P. Police Public Higher Secondary School.

Shashkiya Subhash Higher Secondary School, Shaskiya Navin Malav Kanya Higher Secondary School, Shree Samadhan Public School, Sandipani Higher Secondary School are for control group schools, details of both the group given in table 1.2

Table 1.2 The School wise, Group wise and Gender wise Distribution of Sample for Experimental stage

Sr. .No	Name of School	Type of School	Group	Gender		Total	
				Male	Female		
1	Malhar Ashram Govt. H. S. School, Tilak Path, Rambagh, Indore.	Govt.	Experi-mental.	35	- -	35	
2	Shaskiya Sharada Kanya H. S. School, Bada Ganpati Chouraha, Malhargang, Indore.	Govt.	Experi-mental.	- -	40	40	
3	M.P.Police Public H. S. School, 15 th Battalion, Mahesh Guard line, Kila Maidan, Indore.	Private	Experi-mental.	30	20	50	**125**
4	Shaskiya Subhash H. S. School, BadaGanpati Chouraha, Malhargang, Indore.	Govt.	Control	35	- -	35	
5	Shaskiya Navin Malav Kanya H. S. School, MOG line,Indore.	Govt.	Control	- -	30	30	
6	Shree Samadhan Public School, Sukhliya, Indore	Private	Control	15	10	25	**110**
7	Sandipani H. S. School, Narayan Bagh, Indore.	Private	Control	10	10	20	
				125	**110**	235	**235**

From Table 1.2, it can be seen that the sample was total 235 students taken from seven schools. Out of 235 students, 35 students (boys) were Malhar Ashram Govt. Higher Secondary School, 40 students (Girls) were Shaskiya Sharada Kanya Higher Secondary School, 50 students (30 Boys & 20 Girls) from M. P. Police Public Higher Secondary School, The students' age ranged from 13 to 17 years. The medium of instruction was Hindi in all the selected classes of these schools

1.11.0 TOOLS

In the present study the data were collected by administering standardized tools of memory, while Achievement, Attention and Reaction scale towards Mind Mapping Strategy were assessed with the help of tools developed by the researcher.

The details of these tools are given below;

1.11.1 ACHIEVEMENT TEST

The Achievement of students of class 9th of Board of Secondary education M.P. bhopal affiliated schools in subject of social science was assessed with the help of Achievement test developed by the researcher. The test was derived from chapters taught with mind mapping strategy, this test consisted of 50 objective type questions having four options.Achievement test developed from 8 chapters from textbooks of social science for 9th class which consist of four sub-subjects each sub-subject 2 chapters were selected as fallows Geography; Natural Vegetation And Wild Life ,Population. Economics, Poverty As a Challenge and Food Security In India,. History Nazism and the Rise of Hitler and Forest Society and Colonialism. Civics; electoral Politics, working of Institutions from these chapters frame total 50 question, each correct answer was awarded with one mark and zero marks for wrong answer and no negative marking was done. Maximum marks for this test were 50 and total time given for test was 50 minutes.

Table 1.3 Blue print for achievement test with selected topics, number of questions, total marks

Sub subject of social science	units	Number of question	marks	Total questions	Total marks
History	III	06	06	12	12
	IV	06	06		
Geography	V	06	06	12	12
	VI	06	06		
Civics (political science)	III	05	05	14	14
	IV	09	09		
Economics	III	07	07	12	12
	IV	05	05		
Total	08	50	50	50	50

1.11.2 ATTENTION TEST

The attention of students was assessed by Attention Test developed by researcher which was consist of 12 PowerPoint picture slides, each slide had a picture and it was followed by another 12 question slides containing three questions related to preceding picture slide this picture slides has objective type question, so in this tool total 36 questions related with 12 picture are given.

For testing the attention of students picture slides were flashed for 40 seconds and just after that question slide was flashed for another 40 seconds for answering those questions related to picture slides. Total time assign for conducting this test was 40-45 minutes. Reliability of attention test was found to be **0.753** by Test-Retest method.

1.11.3 MEMORY

For assessment of long term memory of students Long Term Memory test was used which was developed by Agra Psychological Corporation in 1978, it is applicable on subjects of any age group up to 80 years, who can read and count properly. In this test there was a data sheet which has 5 rows and 16 columns. The first column had serial numbers of 16 stimulus sets and second column has 16 sets (triagrams) each of 3 consonants e.g. XFR, THL etc. the third column had numbers indicating how many times the set was supposed to be rehearsed by subject before the interpolated

activity began, number of rehearsal varies between 1to 4 randomly. In such a way that the set has to be revised given number of times that may be 1, 2, 3, 4 times. The fourth column contained a list of double digit numbers to which subject was supposed to add 3's continuously for next 2 minutes. This activity of adding 3's continuously for 2 minutes was meant to keep subject busy in mental activity so that the subject should not get chance to revise the stimulus set any more. The last column had space to note down the responses of subjects which was the original stimulus set. It was made sure that the subject could not see the data sheet kept between the examiner and subject during the test.

1.11.4 REACTION SCALE

Reaction scale was developed by the researcher, the reaction scale was used to assess the response of 9th class experimental group students. The scale was having made of 20 statements out of which 15 were positive and five were negative. Students were supposed to mark their responses on five point scale given with each statement. The points infront of each statement were Strongly Agree (SA), Agree (A), Undecided (U), Disagree, and (D) Strongly Disagree (SD).

Students were instructed to read each statement carefully and put (✓) mark on the desired option out of five alternatives given with each statement. The time duration of the activity was 45 minutes. The marking for both positive and negative statements is For positive statement Strongly Agree (SA),5. Agree (A), 4. Undecided (U),3. Disagree (D),2. Strongly Disagree (SD).1. so maximum m.arks were 100 and minimum was 21,.

1.12.0 EXPERIMENTAL DESIGN

The present study was experimental in nature. The Non Equivalent control group design was used. The layout of Non-equivalent control group design is given below –

O   X   O

O   O
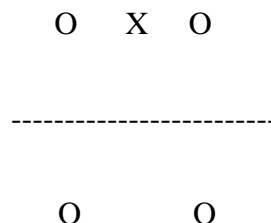
Where –

O   - Observation

X   - Treatment

……   - Non equivalent

There were two groups; one group designated as experimental and other as control group. Both the groups were pre tested by administering tests for Attention, Achievement, and memory. The student of experimental group were taught through mind mapping strategy. Control group students were taught by traditional teaching method by their teachers same as their routine classes.

The treatment was given to the experimental group for 45 minutes classes per day, the total treatment duration was Thirty nine days working days. Treatment material was in Hindi language.

On the other hand the control group continued with their as usual traditional teaching, no separate treatment were given by the researcher to the control group. At the end of the treatment both groups were Post tested with the same tools which were used for pre testing. The reaction scale to estimate students' reaction towards mind mapping strategy was administered to experimental group only.

1.13.0   PROCEDURE OF DATA COLLECTION

The attention tool was prepared and standardized for the purpose of data collection. For data collection, seven schools were selected purposively and permission was obtained from the principals of these schools, which were Malhar Ashram Government Higher Secondary School, Shaskiya sharada kanya higher secondary school, M.P Police public Higher Secondary. School, Shaskiya Navin Malav Kanya Higher Secondary School. Samadhan public school, Sandipani Higher Secondary School, after receiving the permission from principals of above mentioned schools, students of class 9th were oriented with the objectives of present study and rapport was established with students. In the present study there two groups one experimental and one is control. Experimental group had two government and one private school while control group had two government and two private school. After this all experimental and control groups students were pre-tested with Achievement, Attention, and Memory.

The treatment with mind mapping strategy was given two government and one private schools selected randomly called experimental groups. While control groups comprised of two government and two private schools there were taught through traditional teaching method by their teacher. Before started experiment both experimental and control groups were Pre-tested by Achievement, Attention, and memory, thereafter treatment was started. Treatment with mind mapping strategy was started for experimental group which took 39 working days to complete government and private were taught through traditional teaching method as usual. After pretest for all the variables were administered the treatment with mind mapping strategy was started for experimental group. This treatment concluded in 31 days excluding Pre and Post Tests. Class 9th M.P. Board social science textbook was used to create 41 mind maps from total 8 chapters which were in accordance with the academic calendar released by board of secondary education M.P. The same content was taught to control groups of private and government via traditional teaching method by their teacher.

These chapter was uniformly taught because this is according to academic calendar in both groups. At the end of the treatment all the four groups were post-tested with achievement test, attention, memory, while reaction towards mind mapping strategy was taken only from experimental group students.

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Table 1.4 The thematic Presentation of Experiment

Subject- History   Unit - III,   Nazism And The Rise Of Hitler

Title Of Mind Map	No. of Mind Map	No. of Teaching Days
1-Helmuth		
2-Birth Of The Weimar Republic – 1		
3-Birth Of The Weimar Republic – 2	08	
4-Hitler Rise To Power And Nazi Propaganda		04
5-The Destruction Of Democracy And Reconstruction		
6-The Nazi Worldview		
7-Youth In Nazi Germany		
8-Ordinary People And The Crime Against Humanity		

Subject- Geography   Unit –V   Natural Vegetation And Wild Life

Title Of Mind Map	No. of Mind Map	No. Of Teaching Days
1-Bio-Diversity		
2-Causes Of Bio-Diversity		
3-Types Of Vegetation – 1	06	
4-Types Of Vegetation – 2		04
5-Wild Life		
6-Wild Life Protection		

Subject- Civics (Political Science)   Unit – III   Electoral Politics

Title Of Mind Map	No. of Mind Map	No. Of Teaching Days
1-Overview		
2-What Is Our System Of Elections?		
3-Nomination Of Candidates		
4-Election Campaign	06	
5-What Makes Elections In India Democratic?		03
6-Challenges To Free And Fair Elections		

Subject- Economics   Unit- III   Poverty As A Challenges

Title Of Mind Map	No. of Mind Map	No. Of Teaching Days
1-Overview		
2-Poverty As Seen By Social Scientists		
3-Two Typical Cases Of Poverty		
4-Poverty Line	07	
5-Vulnerable Groups		03
6-Global Poverty Scenario		
7-Anti – Poverty Measures		

Subject- History - Unit- IV - Forest Society And Colonialism

Title of Mind Map	No. of Mind Map	No. Of Teaching Days
1-Overview And De-forestation		
2-The Rise Of Commercial Forestry		
3-Rebellion In The Forest	03	
		02

Subject- Geography   Unit- VI Population

Title Of Mind Map	No. of Mind Map-	No. Of Teaching Days
1-Population And Census		
2-Population Size And Distribution	02	01

Subject- Civics (Political Science)   Unit- IV Working Of Institutions

Title Of Mind Map	No. of Mind Map-	No. Of Teaching Days
1- How Is A Major Policy Decision Taken ?		
2- Parliament		
3- Political Executive	04	02
4-The Judiciary		

Subject- Economics   Unit –IV   Food Security In India

Title Of Mind Map	No. of Mind Map-	No. Of Teaching Days
1- Overview		
2- Msp And Buffer Stock		
3- Who Are Food – Insecure?	05	
4- Current Status Of Public Distribution System -1		03
5- Current Status Of Public Distribution System -2		

Total Units -08	**Total No. of Mind Maps - 41**	**Total No. Of Teaching Days - 31 31**

1.14.0 STATISTICAL TECHNIQUES

The objectives wise statistical techniques used for data analysis were as thus techniques were apply any after fulfilment of assumptions of parametric test-

1. For comparing the pre and post mean achievement scores of students taught through mind mapping strategy, data was analysed with the help of correlated 't' test. (The assumptions of correlated 't' test were not fulfilled, so the researcher preceded towards non-parametric Wilcoxon Signed rank test)

2. For comparing the pre and post mean memory scores of students taught through mind mapping strategy, data was analysed with the help of correlated 't' test. (The assumptions of correlated 't' test were not fulfilled so the researcher preceded towards non-parametric Wilcoxon Signed rank test)

3. For comparing the pre and post mean attention scores of students taught through mind mapping strategy, data was analysed with the help of correlated 't' test. (The assumptions of correlated 't' test were not fulfilled so the researcher preceded towards non-parametric Wilcoxon Signed rank test)

4. For studying the effect of gender, treatment and their interaction on achievement of high school students in social science subject when pre achievement is taken as covariate, the data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

5. For studying the effect of gender, treatment and their interaction on attention of high school student when pre attention is taken as covariate, the data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

6. For studying the effect of gender, treatment and their interaction on memory of high school student when pre memory is taken as covariate, the data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

7. For studying the effect of type of school, treatment and their interaction on achievement of high school students in social science subject when pre achievement is taken as covariate. The data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

8. For studying the effect of types of school, treatment and their interaction on attention of high school student when pre attention is taken as covariate, the data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

9. For studying the effect of type of school, treatment and their Interaction on Memory of high school students when Pre Memory is taken as covariate, the data were analysed with the help of two way ANCOVA. (The assumptions of ANCOVA were not fulfilled so the researcher preceded towards Quade's ANCOVA i.e. non parametric statistics)

10. For studying the Reaction of high school student of mind mapping strategy, the data will be analysed with the help of percentage. (Mean, SD, CV and percentile were used to assess the reaction scale)

1.15.0 FINDINGS

The findings that were emerged out from the study are as follows:

1. The treatment with Mind Mapping Strategy is found to be effective in terms Achievement in social science subject of high school students.

2. Treatment with Mind Mapping Strategy is found to be effective in terms of Attention of high school students.

3. Treatment with Mind Mapping Strategy is found to be effective in terms of Memory of high school students.

4. The treatment with Mind Mapping Strategy is found to be effective than traditional teaching in Terms of Achievement in social science subject of high school students

5. Achievement of girls students is higher than boys students of high school when Pre Achievement is taken was covariate

6. In mind mapping strategy group, the Achievement scores of boys were higher than that of girls while in traditional group, girls secured higher achievement scores than boys in social science subject. Mind mapping strategy group students have higher achievement scores than traditional group in social science subject.

7. Treatment is found to be effective than Traditional teaching group in terms of Attention when Pre Attention is taken as covariate

8. There is no significance difference in boys and girls Attention score, when Pre Attention score is taken as covariate

9. There is no significant interaction effect of Treatment and Gender on Attention of high school students.

10. Treatment with Mind Mapping Strategy is found to be effective on memory than traditional teaching when Pre Memory is taken as covariate

11. Memory of boys is higher than Girls students when Pre Memory is taken as covariate

12. There is no significant interaction effect of treatment and gender on memory, when Pre Memory is taken as covariate.

13. Mind Mapping Strategy is found to be significantly effective than Traditional teaching, when Pre Achievement is taken as covariate.

14. There is significant effect of types of school on Achievement in Social Science subject of High School students. The mean scores of Achievement in Social Science subject of Private School students is significantly higher than Government School students type of school students, when Pre Achievement is taken as covariate,

15. There is significant interaction effect of treatment and Types of School on Achievement in Social Science subject of High School Students. The unstandardized residual mean score of Government school students of Mind Mapping group is higher than Private schools students while just opposite in Traditional Teaching group.

16. Mind Mapping Strategy is found to be effective in terms of Attention of private school students.

17. The Attention of High School Students was found to be independent of Types of school .

18. There is no significant interaction effect of treatment and Types of School on Attention of High School Students.

19. Mind Mapping Strategy is found to be effective in enhancing Memory level of government schools experimental group students.

20. The Memory of High School Students was found to be independent of Types of school When Pre Memory is taken as covariate.

21. There is no significant interaction effect of treatment and Types of School on Memory of High School Students When Pre Memory is taken as covariate.

22. The high School students of Mind Mapping Strategy group were having overall positive reaction towards the treatment .

1.16.0 EDUCATIONAL IMPLICATIONS

The present study revealed that mind mapping strategy was found to be significantly effective in terms of achievement in social science, Attention and Memory of class 9th students from schools of Indore city which were affiliated to M.P. Board of Secondary Education, Bhopal.

The findings of this study have implications for teachers, text book writers, curriculum planners, text book publishers and school administrators.

The implications are as follows-

- **Implications for students**: Mind mapping strategy has lots of benefits for students. The learner can use this mind mapping for making notes of broad concept in very structured way and organize information with the visual presentation in a holistic manner, which increases their mental flexibility. In the structure of Mind map lines, key words, phrases, links, symbols, colored branches, arrows, images, pictures are used which grasp attention and allow the flow of student's thoughts. These visualizations give rise to many more association than verbal. They can understand concept with making creative associations between ideas. They can easily revise and recapitulate the essential points of concept in visual graphic pattern. Student can retain and recall the information of concept precisely. They can create their mind maps by making association and creating a network of concepts by adding the keywords related to the central idea in a pictorial form. Such kind of mind mapping will help the students to acquire knowledge and in understanding the concept better.

  Mind mapping helps the student to learn the complex concept in simpler way. It helps the students to revise the notes during their examination.

- **Implications for teachers**: In today's technological and digital era, it is the responsibility of teachers to not only educate the learners but also to facilitate the process of knowledge transaction through mind mapping strategy. By this strategy, learners actively engage and build their knowledge stronger by connecting concepts, ideas, keywords, links and associations for a significant integration. For this, using strategies to acquire student's attention, interest and involvement, encouraging active and meaningful learning are some efficient ways to teach social science. It is remarkable step to shift to new innovative methods of teaching-learning and by forgetting chalk and talk method. The mind mapping strategy would also be helpful for teachers in teaching concepts with visualization in holistic way and presenting them effectively.

  School teachers can use mind maps for planning and organizing curriculum, units and lesson plans. This mind mapping strategy helps in acquiring better

understanding and conceptual clarity. School teachers can use this method to recapitulate previous lessons in innovative form in such a way that the main point easily be remembered. This will make learning for students a stress-free task.

➢ **Implications for teacher educators**: In present competitive scenario have been seen today. In the teacher education, teacher educator trains to, future to be school teachers, the teacher educators enables their trainees to become competent in their subjects through innovations pedagogical tools. So that the trainees can enhance their knowledge and conceptualize their understanding of concepts and different subject. Teacher educator should use this mind mapping strategy in their teaching processes. The trainees also can be incorporate such kind of mind maps in their lesson planning that will definitely enhance their conceptual clarity of concepts. Through this mind mapping trainees can prepared their notes, in visualize form with pictorial diagramed and enhance their memory skills.

Teacher educator can use as method of teaching in social science pedagogy. So future teachers will aware for this mind mapping strategy and they can improve their teaching competencies

➢ **Implications for content/curriculum developers:** The curriculum developers or content developer for school text book they can use for presenting chapter wise gist of that content in between and last in the every chapters. The visual form of Content in mind maps with pictorial connections helps in memorizing all essential points of whole chapter's hard and difficult concepts,

It is advise for curriculum developer in the social science subject they can make supplementary drill book to improve memory and attention

➢ **Implications for book writers**: Mind Mapping can be useful for text book writers, they can use mind maps in text books, for understanding with key words and summarizing for revision purpose, they can present their content in visualize form. They can make Supplementary drill book involve in that map reading by mind mapping.

1.17.0 SUGGESTIONS FOR FURTHER RESEARCHERS

The researcher expect that the present study will promote to different dimensions for further researchers in the area of teaching and learning. In this present study it has been tried to present some possible /explorable areas in which the future studies can be conducted in the line of present research:

- The present study was carried out to study the Effectiveness of mind mapping strategy with Attention, Memory, Achievement and reaction, further study can be done with different variables Critical Thinking, problem solving, Creativity, study habit and Self -Confidence.

- A comparative study of Mind Mapping Strategy and Concept Mapping can also be conducted

- Research studies can be carried out by using similar method in different subject like : language, science , mathematics, and any other

- At different level like higher secondary, Graduation and university level also

- Hindi Medium School were selected for this study further can study on English medium schools can choose as a sample.

- The Attention tool used in the research was developed and standardized by researcher.

- The study comprised of Achievement, Attention, and Memory as dependent variables, and Mind Mapping Strategy, Gender and Type of School as independent variable

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