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EFFECT OF MIND MAPPING APPROACHES IN IMPROVING STUDENTS' LEARNING OUTCOMES AT ELEMENTARY LEVEL

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ABSTRACT
The basic purpose of current work is to determine the effect of the Mind Mapping Approach (MMA) on improving students' academic performance in science, as well as their effect on improving students' learning outcomes. These were conducted in order to determine the best methods of teaching for the improvement of students' science learning outcomes. The non-equivalent post-test, pre-test experimental design was used in this study. In Multan tehsil Saddar, 43 basic educational elementary schools were chosen using a simple random sampling technique. The eighth-grade classes were used for the research. The "Science Achievement Test" was used for data collection (SAT). According to the study, MMA can help improving students' learning outcomes in science; with, MMA that could improve students' learning outcomes more effectively. It is thus recommended that the Education Ministry should conduct trainings for science teachers on how to effectively implement these pioneering teaching tactics during instruction so that students can be guided to learn meaningfully and are helped in remembering, what they have learned in science.
Keywords: Mastery learning, Mind Mapping, Learning outcomes.

INTRODUCTION
We need to train students to use their environment to meet the technological needs of their society. Science is a basic subject that is relevant to one's environment. Knowledge gained from scientific experiments and observations is called science (Bello, 2011). Science explains the natural features of our environment; it shows the relationship between the different things in our environment. It is very important for our children to have scientific knowledge so that they can know the environment and recognize the things in the environment (Minolin, 2015). Science encourages our children to investigate. The principles of science are used in our daily lives. And by following these principles, we are making life easier for people. Science has rose up our life (Buzan & Buzan, 1996b).

A mind map is a map in which information appears in the form of branches. This pictorial method records long time learning, brain storming, visual thinking and problem solving. Bozun first promoted his radial tree Mind Mapping concept input on BB TV series called "Use Your Head" in 1974 (Durmuş, 2001).

A study in which concept was 80% students thought the concept and learning of science understood by mind mapping Cunningham (2006). Mind mapping is helpful for the students of arts also. The meta study decided that mind mapping is more fruitful for students than reading text passages or lecture method traditional approach (Yore, 2001). Mind mapping helps learners to associate, generate, reconstruct, synthesize and resynthesize the knowledge on the basis of existing

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knowledge (Vanids et al., 2005). Science promotes critical thinking, visual learning, innovation and creativity. This type of learning has the potential to create the key; stone for solid and meaningful lifelong opportunities. Where there are many benefits to mind mapping, there are some drawbacks of mind mapping as all pictures have distortion because it is impossible to represent the three-dimensional objects on flat board. Here are some more mining drawbacks of mind mapping as: 1) Students cannot draw the picture efficiently; 2) It looks like unprofessionally technique; 3) Mind mapping can carry very little information; 4) Mind map takes longer time than regular note taking; 50 It is difficult for linear thinkers (Findlay & Lumsden, 1988).

In Pakistan there is immense need to do research at improving students learning outcomes. Very less research is conducted at exploring the ways which could improve the student's learning outcomes. This research is conducted to fill that gap at some level. This research will also help future researcher in this regard.

Objective

To explore the effect of Mind Mapping Approaches in Improving Students' Learning Outcomes.

REVIEW OF LITERATURE

A mind map is defined as "a multicolored and image-centered radial diagram that depicts semantic or other hierarchically connected links between chunks of learned material" (Eppler, 2006). Mind maps, also known as "idea" maps, can be used to brainstorm creative associations of ideas as well as memorize information (Davies, 2011).

Significance of Mind Mapping Approach

1. A free-form and uncontrolled structure
2. Information is organized around a specific theme.
3. It's simple to add new content and expand.
2. Provides a concise overview of knowledge structure in a hierarchical (radial) format.
3. Quickly expresses the relative worth of concepts/ideas.
4. It promotes idea generation, brainstorming, and creative thinking.
5. It promotes nonlinear and visual thinking.
6. Promotes self-expression and creativity.
7. A higher level of knowledge recollection.
8. Easy to comprehend and apply (Buzan & Buzan, 1996b).

Drawbacks of Mind Mapping Approach

1. Excessively complicated and lacking in "big picture."
2. Links are basic connections between ideas that do not appear to be related.
3. Different maps have varying levels of detail.
4. It primarily depicts hierarchical relationships.
5. Only simple relationships are permitted.
6. Idiosyncratic design makes maps difficult for others to interpret (Eppler, 2006).

Effectiveness of mind mapping approach

The researcher used tony Buzan's mind mapping technique to value the effectiveness of mind mapping in schooling. As a result, the study's primary goal was to determine the usefulness of the mind mapping approach in relation to the students' academic achievements, and a case study for mind mapping in class 8th social science subject was created. In this study, teaching style was used as an independent variable, academic achievement as a dependable variable, and gender as a converter variable. Buzan (2006), is of the opinion that mind mapping is the application that provides us with significant information in an easy to comprehend format. The mind mapping method is a technique that prepares the mind so that figures can be logically and imaginatively combined in the brain to generate an image.

In mind mapping technique, the fundamental idea is described first, followed by the linear view. It can also be used for self and group evaluation, where it has a greater impact than a written evaluation. This method is appropriate for teachers and students to use for recurrence and easy understanding of difficult ideas. It also motivates students to continue their education. This strategy boosts your motivation to study the students by expanding your creative capacity in new concepts. Mind mapping can be used to introduce students to mind mapping principles and experiments, as well

as to supplement instructor instruction and make studying more enjoyable. It is widely used and regarded as the best method for preparing notes, annual plans, session plans, daily plans, text and presentations, tests, and special education programs in the world.

The views of the teachers about the mind mapping technique

According to one of the findings, teachers lacked competency in the sections of the lesson presented using constructivist method, which is why they only used the introduction and evaluation phases when applying the technique of mind mapping to the lesson parts. The educators believe that by applying mind mapping technique, spoken instruction would improve its effectiveness. While the characteristics that provide immovability in students' attainment and increase exam success can be viewed as advantage of this technique, the potential problems with time constraints can be viewed as a disadvantage (Yasar,2001)

Change is required in the information age we now live in, particularly in education. Our day's information is dynamic and adaptable, and it refreshes itself at a breakneck pace. As a result of this dynamism and variety, education must adapt to the digital era's circumstances in order to obtain and apply that information. As a result, people must constantly renovate and improve themselves. Rather than simply passing on what they already know, the primary goal of our educational system should be to teach students how to find information. Higher-order mental processes demonstrate this. In other words, solving a scientific problem requires learning skills rather than memorization, so the skills must be related to scientific method (Yasar, 2006). According to constructivists, when people gain real-life experience, they build their own knowledge in their minds (Isman, 1999).

According to one study, constructivism is basically related to the knowledge that people caught in their minds through some experience and about where the people got such information, how the people organized such information, what the purpose of such information is and how it relates to our current issue, and how we can use such experienced information in any problem. Because the student's mental level cannot cope with the teacher's mental level, the teacher cannot fully transfer their own point of view to the student. . The purpose is to up bring the individual who make their own probes about a thing and make some critical thinking. The use of these tools is very important as it provides powerful and significant learning (Butunere, 2006).

In traditional technique to sort the ideas the aim was to remember information in written or oral communication, to make the analysis of the problem or a plan to bring out the new ideas. The standard design used in the traditional method was consisting of linear sentence, number or letters as an organized list. Because of the deficiency of visual measure, color, spatial and image relations, these methods courses brain to weaken (Seyihoglu & Kartal, 2010).

Mind mapping as a visual learning strategy

In a general education, environmental science class for primarily emirate English language learners, mind mapping was presented as culturally relevant methodology aiming at improving the teaching learning experience. According to anecdotal data, the pupils are very visual and artistic, and they like group events. It was determined to include an intervention that would integrate emirate collaborative and artistic practices in order to engage them on all levels and improve their academic performance. Preliminary findings from ongoing active study with a group of 60 students reveal that this strategy is effective in helping students' summaries lengthy classes and boost student involvement and conversation among peers, allowing them to reinforce scientific concepts and theories (Hart & Lee, 2003).

This strategy also allows for on-the-spot discovery of student misconceptions, as the instructor may provide quick comment. For Arabic Ells in science, the results satisfy rarity in the literature on effective scholastic policies. The teaching atmosphere at the middle eastern university, as well as in the gulf region, most of other universities, is the one in which students are taught, mostly by expats. These English language learners have trouble understanding directions given by a faculty that is culturally diverse and primarily native English speakers. Many students may find such a learning environment intimidating, as they are obliged to learn through the medium of a language they have not yet mastered (Hart & Lee, 2003).

Students who do not have the necessary literacy development in English are more likely to have academic learning issues, which will stymie their participation and, eventually, their learning in science classes (Llee & Fradd, 1996).it is also thought that, as compared to their English-speaking

peers, these types of restrictions may lead to worse academic achievement in science for ells (Nces, 2000).

One of the issues that science instructors, in the United Arab Emirates University, were concerned about was this. The majority of the students here in the institution were Arabs, with a considerable percentage of them being rookie ells and practically all majoring in fields other than science. Students in science classes had low comprehension, according to assessment data and overall classroom observations. This was compounded by a lack of transferability and retention. There was also a dearth of critical thinking and evidence of rote learning. As a result of studying science course in a language they didn't understand in a topic in which they weren't likely to major, students were frequently weary, frustrated, and demotivated.

The goal was to develop best practice strategies for ells that would achieve the given goals: increasing students' involvement, Boost student performance and understanding, encourage children to develop intrinsic drive and self-efficacy in science. Encourage analytical and critical thought. Inspire people to want to study more about science. In addition to these aims, the teaching strategies should provide a meaningful environment for the development of English literacy and language, as well as a medium for engagement with scientific material (Lee, 2005).

In its most basic form, mind mapping is a visual aid for organizing data. It was created 3 decades ago as a note-taking and summarizing approach that capitalized on the distinct capabilities of the two hemispheres of the brain, and it was popularized by psychology author tony Buzan. The left part of the brain is liable for logic, words, sequences and analysis whereas the right part carries out different tasks associated with emotions, colors, imaginations and shapes. Both hemispheres are used in Mind mapping and so processing productivity will be enhanced in a better way. (Buzan, 1976). Mind mapping is around a one concept, around which images, words and ideas are placed. Major concepts are inextricably linked to the supporting ideas and fundamental concept, radiate outwards from the central topic (Eeppler, 2006).

The basic notion is that ideas should progress from abstract to concrete (Meier, 2007). Mind mapping is a visual representation of material in an open, flowing fashion that encourages people to think naturally and creatively. Mind maps' aesthetically appealing nature, with their use of colors and graphics, would be a good tool to pique the interest of our largely artistic kids and boost their participation in class. This visual attractiveness is also believed to increase memorization and recall, speeding up the learning process (Brinkmann, 2003). Mind mapping, Zhao argues, is a pedagogical tool that promotes constructivist learning theory, particularly in a class of environmental science (Zhao, 2003).

The findings demonstrate that mapping approaches can make learning of a student, a process of making sense of new material and integrating and combining it with present knowledge configurations, which has been shown to be effective in the teaching of environmental science. The use of this visual technique is justified since mapping is regarded an active learning strategy that allows the instructor to provide immediate feedback while also respecting different skills and learning styles. Individuals must be engaged with topic and with others, reveal prior concepts, build connections between ideas, and experience based new generated knowledge, according to active learning methodologies (Ueckert & Gess-newsome, 2008).

Mind mapping can help pupils improve their science grades. On average, students who employed mind mapping scored higher on a post-instruction achievement test than the control group. In addition, the experimental group made statistically momentous gains in key areas like conceptual understanding and practical reasoning. More time was spent by students on activities, and they were very driven and involved, according to general observations (Mona & Adbelkhalick, 2008)

The majority of our students, both male and female, seemed to like the use of mind maps. The time consumed for task had increased, and it was not uncommon for pupils to linger after class to finish debates or drawing mind maps. Schoolchildren were spotted relating their maps to one another and making revisions when they thought critical elements were missing. Explaining ideas to colleagues who had not comprehended a topic as fast or needed more explanation, students might be heard employing more code-switching and scientific jargon between English and Arabic. The use of mind maps clearly accommodated the pupils' diverse learning methods. When given free rein, some students chose to utilize pencil and paper (see figure 1), while others chose to use mobile applications to experiment with colors and images (Eppler, 2006). The iPod and mobile phones were used to

access the mobile applications. Simple mind and inspiration were the most popular applications for creating the maps (Wilson, copeland-solas, & guthrie-dixon, 2016).

Impact of Digital Mind Map on Science Achievement

The goal of this study was to see how digital mind maps affected science achievement among Saudi Arabian sixth graders. The survey included a total of 44 female students from the second semester of the school year 2012-2013. The pupils were divided into two experimental groups and given unlike treatments at random. During their learning process, the first group (DMM) used digital mind maps, while the second group (PMM) used paper mind maps. The findings demonstrated that employing digital mind maps improved students' science achievement significantly (jbeili, 2013).

Implication of mind mapping approaches in special teaching methods

In the constructivist approach individuals made association between their previous familiarities and new material in order to construct knowledge in their minds and learn. As a result, it's critical to elicit students' prior knowledge and, if any, to identify any misconceptions or poor comprehension. Pre-knowledge and new information of students learned during the learning process are elicited using two-dimensional visual techniques and tools. Mind mapping is one of the visual approaches that is utilized in conjunction with the specified objectives. Teachers can examine students' mental maps to see if they grasp the material and can develop a suitable structure for the new information (Zhao, 2003).

Furthermore, the mind map aids pupils in assimilation of new information, thinking, and conceptual schema development. As a result, it's thought that mind maps could be useful in constructivist science classes. According to Mento, Martin Elli, and jones (1999), mind mapping is a technique that boosts creativity and helps people learn. They guarantee that people will remember information and be able to connect disparate ideas and concepts (BuzaN, 1995; Buzan, 2002; Buzan, 2005). Thus, mind mapping might give feedback to the teachers on their students' mental structures and growth, could aid students in recalling content by employing visual features, and could be used as an exercise that encourages students to participate in the lecture. In present years, there have been a slew of studies published in the literature attempting to determine the efficacy and limitations of mind maps (Williams, 1999; Brinkmann, 2003; Ling, 2004) (Evrekli, Balim, &Iinel, 2009).

Use of mind map to make students questioning effective

Student questioning is an important learning method, but it is rarely used in many classrooms because teachers are concerned about whether these inquiries help students achieve their curricular goals. Teachers must figure out how to make student questions useful for learning the curriculum. A principle-based scenario for guiding successful student inquiry was devised and tested for relevance and practicability in two earlier studies to address this difficulty. Mind maps help teachers and students explore and develop on a core curriculum by raising, investigating, and exchanging student questions in the scenario, which consists of a series of pedagogical actions. (Stokhof et al., 2017a, b)

A follow-up study is offered in this report that looked at the impact of the scenario on student results in terms of achieving curricular goals and to measure individual and collective learning outcomes of student questioning pre- and post-test mind maps were used. Findings showed that a majority of students progressed in learning the core curriculum and elaborated upon it. It also suggested that visualizing knowledge construction in a shared mind map supports students to learn a core curriculum and to improve their knowledge structures (Stokhof, De Vries, Bastiaens, & Martens, 2020).

RESEARCH METHODOLOGY

Research Design: Researcher has used Quasi-Experimental Research Design to conduct this study because it states the cause-and-effect relationship between two groups. Researcher has also used this design because it is less expensive and valid. Pretest and posttest are also a type of experimental research design, and this study utilized these tests to confirm the effectiveness of MMA on student learning outcomes in science subject.

Research Population: The study's participants are all District Multan elementary school students. The population is the total number of elements from which subjects are selected (Faiz et al., 2021; Kanwal et al., 2022; Lakhan et al., 2020; Ali et al., 2021; Sajjad et al., 2022; Siddique et al., 2021).. If

the population having a finite number or units of a group is called finite population. A group which has uncountable unit identities is called infinite population (Creswell, 2012).

Research Sample: The sample were the number of subjects chosen from the population (Jabeen et al., 2022; Ali et al., 2021; Siddique et al., 2021; Mah Jabeen et al., 2021; Munir et al., 2021; Saeed et al., 2021; Siddique et al., 2020). Researcher selected the GGES Bakht Ali Wala Markz 5-Faiz for sample and selected grade 8th for experiment.

Tool of Study: Instrument utilized in the study was 100 various choice question test items prepared from the science book of Grade 8. The test instrumentation gets information on the bio-data of respondents. And this tool is divided in two parts the one is pretest and the other is posttest. Pretest used to check the prior knowledge of students while the posttest used to check the knowledge gained by MMA.

Research Procedure: This was carried out in stages. The researcher travelled to the selected school in the first phase to obtain permission to use the children and some of the school's resources. Following that, pupils were given Science Achievement Test (SAT) as a pre-test to assess their skill comparability. The therapies were led in the experimental groups in the second phase. The MMA was employed to teach students Two themes (nervous system) were taught in cycle for four weeks in school, with the appropriate therapy. The t-test was chosen while dealing with two means since it has a better ability to detect differences between pre and post assessment at a significance threshold of 0.05, the null hypotheses were tested.

DATA ANALYSIS AND INTERPRETATION

Table No. 1 Pretest result of student's responses taught with mind mapping technique

Subjects	*No of items*	*No of respondents*	*Mean*	*S.D*
Biology	24	30	67.96	2.2
Chemistry	32	30	91.60	2.3
Physics	44	30	125.40	3.6

Table illustrates Pretest Results of students Responses taught with Mind Mapping Technique. It is comprised of 3 subjects. In the first subject, which was biology Total items were 24, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 67.96% and S.D at 2.22% respectively. While, in second subject, which was chemistry Total items were 32, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 91.60% and S.D at 2.32% respectively. Lastly, in third subject, which was physics Total items were 44, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 125.40% and S.D at 3.65% respectively.

Table No. 2 Posttest result of student's responses taught with mind mapping technique

Subjects	*No of items*	*No of respondents*	*Mean*	*S.D*
Biology	24	30	70.8	1.9
Chemistry	32	30	91.6	1.3
Physics	44	30	130.4	1.6

Table illustrates Posttest Results of students Responses taught with Mind Mapping Technique. It is comprised of 3 subjects. In the first subject, which was biology Total items were 24, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 70.80% and S.D at 1.93% respectively. While, in second subject, which was chemistry Total items were 32, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 91.3% and S.D at 1.35% respectively. Lastly, in third subject, which was physics Total items were 44, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 130.46% and S.D at 1.66% respectively.

Table No. 3 Comparison of Technique Analysis of Biology

Sr#	*Teaching techniques*	*No of students*	*Achievements*
1	Pre mind mapping	30	67.9
2	Post mind mapping	30	70.8

Table Posits compendious results regarding four techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 67.96%

achievement. While, the second technique, possessing post mind mapping, reveals 30 students' respondents procure 70.80% achievement.

Table No. 4 Comparison of Technique Analysis of Chemistry

Sr#	*Teaching technique*	*No of students*	*Achievements*
1	Pre mind mapping	30	91.6
2	Post mind mapping	30	91.6

Table Posits compendious results regarding four techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 91.60% achievement. While, the second technique, possessing post mind mapping, reveals 30 students' respondents procure 91.63% achievement.

Table No. 5 Comparison of Technique Analysis of Physics

Sr#	*Teaching technique*	*No of students*	*Achievements*
1	Pre mind mapping	30	125.4
2	Post mind mapping	30	130.4

Table Posits compendious results regarding four techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 125.40% achievement. While, the second technique, possessing post mind mapping, reveals 30 students' respondents procure 130.46% achievement.

Table No. 6 Comparison of Mean Scores of Pre and Post Mind Mapping Technique (Paired Sample T-Test)

Description	*N*	*Mean*	*S.D*	*t*	*df*	*Sig.*
Pre Mind Mapping	30	75.9	8.1	3.20	29	.00
Post Mind Mapping	30	82.3	7.0			

*P<.05 Level of Significance

Table 4.8 indicates that the empirical information for pre Mind Mapping (N=30, M=75.90) and for post Mind Mapping (N=30, M=82.33) with t-statistics (t (29) = 3.20, P < .05 = .003) which leads to the decision that there is a significant difference in the opinion of pre and post mind mapping regarding effect of Mind mapping teaching approach on academic performance of students. Moreover, it illustrates that the difference of means is 6.43 for pre and post mind mapping technique which is also significant.

Table No. 7 Comparison of Mean Score of Pre-Mind Mapping and Post-Mind Mapping Technique in Biology

Teaching technique	*No of respondents*	*Achievements*
Pre Mind Mapping	30	67.9
Post Mind Mapping	30	69.2

Table Posits compendious results regarding two techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 67.96% achievement in biology subject. While, the second technique, possessing post mastery learning, reveals 30 students' respondents procure 69.20% achievement in biology subject.

Table No. 8 Comparison of Mean Score of Pre-Mind Mapping and Post-Mind Mapping Technique in Chemistry

Teaching technique	*No of respondents*	*Achievements*
Pre Mind Mapping	30	91.6
Post Mind Mapping	30	93.3

Table Posits compendious results regarding two techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 91.60% achievement in chemistry subject. While, the second technique, possessing post Mind Mapping, reveals 30 students' respondents procure 93.30% achievement in chemistry subject.

Table No. 9 Comparison of Mean Score of Pre-Mind Mapping and Post-Mind Mapping Technique in Physics

Teaching technique	*No of respondents*	*Achievements*
Pre Mind Mapping	30	125.4
Post Mind Mapping	30	128.7

Table Posits compendious results regarding two techniques as enshrined above. The first technique, possessing Pre-Mind Mapping, reveals 30 student respondents procure 125.40% achievement in physics subject. While, the second technique, possessing post Mind Mapping, reveals 30 students' respondents procure 128.7% achievement in physics subject.

Table No. 10 Biology 2: Comparison of Mean Scores of Pre and Post Mind mapping Technique (Paired Sample T-Test)

Teaching technique	*N*	*Mean*	*S.D*	*t*	*df*	*Sig.*
Pre Mind Mapping	30	67.9	2.1	-6.963	29	.00
Post Mind mapping	30	70.8	1.9			

*P<.05 Level of Significance

Table indicates that the empirical information for pre Mind mapping (N=30, M=67.93) and for post Mind mapping (N=30, M=70.80) with t-statistics (t (29) = -6.963, P < .05 = .00) which leads to the decision that there is a significant difference in the opinion of pre and post mind mapping regarding effect of Mind mapping teaching approach on academic performance of students. Moreover, it illustrates that the difference of means is 2.87 for pre and post mind mapping technique which is also significant.

Table No. 11 Chemistry 2: Comparison of Mean Scores of Pre and Post Mind mapping Technique (Paired Sample T-Test)

Teaching technique	*N*	*Mean*	*S.D*	*t*	*df*	*Sig.*
Pre Mind Mapping	30	91.8	2.0	-5.533	29	.00
Post Mind mapping	30	94.6	1.3			

*P<.05 Level of Significance

Table indicates that the empirical information for pre Mind mapping (N=30, M=91.83) and for post mind mapping (N=30, M=94.63) with t-statistics (t (29) =5.533, P < .05 = .00) which leads to the decision that there is a significant difference in the opinion of pre Mind mapping and pre mastery learning regarding effect of Mind mapping teaching approach on academic performance of students. Moreover, it illustrates that the difference of means is 2.8 for pre mind mapping and post mastery learning technique which is also significant.

Table No. 12 Physics 2: Comparison of Mean Scores of Pre and Post Mind mapping Technique (Paired Sample T-Test)

Teaching technique	*N*	*Mean*	*S.D*	*t*	*df*	*Sig.*
Pre Mind Mapping	30	125.5	3.4	-8.626	29	.00
Post mind mapping	30	130.4	1.6			

*P<.05 Level of Significance

Table indicates that the empirical information for pre Mind mapping (N=30, M=125.5) and for post Mind mapping (N=30, M=130.4) with t-statistics (t (29) = -8.626, P < .05 = .00) which leads to the decision that there is a significant difference in the opinion of pre Mind mapping and post mind mapping regarding effect of Mind mapping teaching approach on academic performance of students. Moreover, it illustrates that the difference of means is 4.9 for pre and post mind mapping technique which is also significant.

FINDINGS AND DISCUSSION

Pretest Results of students Responses taught with Mind Mapping Technique. It is comprised of 3 subjects. In the first subject, which was biology Total items were 24, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 67.96% and S.D at 2.22% respectively. While, in second subject, which was chemistry Total items were 32, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 91.60% and S.D at 2.32% respectively. Lastly, in third subject, which was physics Total items were 44, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 125.40% and S.D at 3.65% respectively.

Posttest Results of students Responses taught with Mind Mapping Technique. It is comprised of 3 subjects. In the first subject, which was biology Total items were 24, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 70.80% and S.D at 1.93% respectively. While, in second subject, which was chemistry Total items were 32, which were

taken from science book. Wherein, the total respondents were 30 students, rendering Mean 91.3% and S.D at 1.35% respectively. Lastly, in third subject, which was physics Total items were 44, which were taken from science book. Wherein, the total respondents were 30 students, rendering Mean 130.46% and S.D at 1.66% respectively

Rooda (1994), who inferred that MMA is a viable apparatus for further developing nursing understudy execution. As indicated by Rao (2001), the strategy is worried about real information review and to a great extent overlooks more elevated levels of mental results; the instructor looks to move contemplations and implications to the students, practically ruling out understudy started questions, autonomous idea, or connection between understudies, it is additionally hindering to understudies' learning cycle (Zoller, 2000).Students are more occupied with their learning and hold more data when intelligent procedures and systems are utilized, providing them with a feeling of achievement. Accordingly, for instructors to get positive criticism from understudies, connecting with classes should be given.

CONCLUSION

The study found that MMA is more effective in improving students' academic performance in science. This implies that MMA has the potential to assist students in associating ideas, thinking creatively, and making connections. Although the approach used in this study is similar in terms of how it improves learners' retention of science concepts. This implies that the MMA could improve the retention ability of the learners in the same proportion. As a result, MMA would be one of the most effective learning strategies that teachers could use to overcome many of the problems encountered in science teaching and learning. Because most students struggle to learn science. Where the necessary facilities for MMA are available; it should be used to maximize learner output.

RECOMMENDATIONS

The following recommendations are made based on the findings of this study and the conclusion reached:

- Science teachers and specialists should focus in their endeavors on understanding the attributes, qualities, and shortcomings of individual students to aid the plan of proper educational projects to address their issues.
- In light of the review's discoveries that MMA altogether further develops learning, it is suggested that science instructors carry out the methodology, as well as other participatory procedures, during guidance so understudies can be directed to advance seriously.

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