

PMI (PLUS-MINUS-INTERESTING): AN ATTENTION- DIRECTED STRATEGY FOR ENHANCING CREATIVE THINKING AMONGELEMETARY SCHOOL STUDENTS

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Abstract

The purpose of the research is to investigate the effect of PMI (Plus-Minus-Interesting) strategy of creative thinking of Elementary school students. Pre-test post-test control group quasi experimental design used for the present study. In order to equate the groups before conducting the experiment, two tests- one for intelligence and other for SES were applied. The study was carried out on a sample of sixty student's studying in 7th class of University Campus School, Rohtak. The students in control group were taught by conventional method and experimental group were taught by PMI (Plus-Minus-Interesting) strategy. The findings of the study revealed that PMI (Plus-Minus-Interesting) strategy is effective in enhancing creative thinking among 7th graders.

Key words: PMI(Plus-Minus-Interesting), Creative Thinking

INTRODUCTION

Technology has transformed the society. In the last two decades, technology has radically spread in almost all walks of life and education is not exemption to it. So we all are living in the digital era of technology. If we want to survive in this era, we have to acquire educational knowledge according to the needs of educational scenario. Because of the present era, teachers are also facing new challenges how to help students / learners to attain educational objectives by making their classroom interaction more interesting and effective. In order to make teaching learning process effective, interactive, meaningful, teachers try to incorporate new strategies in this process to meet the educational needs of the heterogeneous group of students in the present era of digital technology.

Research studies conducted by the scholars have shown that many strategies like Cooperative learning (Johnson & Johnson, 1998), Multimedia approach (Sharma & Priyamvada, 2017), Constructivist approach (Sharma and Poonam, 2018), Flipped classroom (Sharma and Chawdhry 2018), PMI (Plus-Minus-Interesting) are available in the field of education at every level to be used by the teachers but every strategy has its pros and cons. These strategies used by the teachers help learners to develop the ability of how to think instead of emphasizing on 'what to think' (Clement and Lochhead, 1980 & Schafersman, 1991). The ability i.e. 'how to think' help in developing the ability to think subject matter in accordance with cognitive, affective and psychomotor domain of their personality.

At Elementary the secondary level, students thinking level lie between memory and understanding level. Where teachers play key role as students act and interact with in the framework let by teachers for realizing the set objectives of the teaching. Therefore, teachers have to be very careful in choosing such strategies which help in developing among the learners the ability of 'how to think', in other words, creative and critical thinking among learners. Among such strategy-PMI given by E. De. Bono (1982) significant as it can provide an interactive environment to learners, at elementary level where they can participate in classroom activities in a proactive manner. Here recitation method will find a back place.

PMI (PLUS-MINUS-INTERESTING)

“We don’t think clearly and often we don’t enjoy thinking because we’ve become trapped inside certain thinking methods.” (De Bono, 1988)

PMI is an attention directed tool is the brainchild of Edward de Bono (1982). PMI is a critical thinking strategy which helps learners to consider different aspects of a situation, problem or issue and help in achieving students curiously about topic & engage them in learning. “Plus, Minus, Interesting is a way to analyse ideas, texts (written, visual, digital) and topics for learning. It helps students in the finding the solution of the problem easily” (Mirawati & Zul, 2013; Ahmed & Omotunde (2012); Conklin (2012); Bennett (2001); Ponnia (2010). Studies conducted by (strteeter (2004) & Sanchez (2010) found many advantages of PMI strategy, the most significant are helping students in decision making , improving critical thinking, problem solving and evaluation; in enchaining their social skill and enabling them to measure both the aspects i.e. positive and negative aspects of debate; can helps students to give an opinion based on their point of view; can be used for making specific information into some columns; can be foster analytical thinking; used in many content areas (teaching or non-teaching process). By using this strategy, teachers encourage learners to feel free in sharing their ideas with their classmates. Sharma and Priyamvada (2018) states that the PMI strategy can help the teachers to modify their teaching- learning process by incorporating PMI strategy to enable children to improve their creative and critical thinking.

CREATIVE THINKING

No country can ignore or overlook the importance of creativity in scientific and technological progress in this era, but also society in common. It is the concern of each country to recognize such talent and develop and enhance creative prospective in the learners. Now-a-days researchers are eager to study cognitive processes, traits of personality, background experiences and motivational patterns enlighten creativity. However to comprehend creativity, we must look to social environment too as social factors support creativity, It was Guilford who first focused on creativity and concluded that creativity is a basic concern in the national interest. Torrance unravels unfailingly the positive domain in educational practice. Modern times, most psychologists and educationists are of the view that all human being have some creative

potential, although there may be vary person to person on the basis of individual differences in degree.

Guilford (1960) stressed on the “divergent production, however he has conceptualized creativity in terms of mental abilities involved in creative pursuits. He defined, "creative thinking is a form of thoughts that is divergent." According to Torrance (1962) “creativity is the process of seeing problems or gaps in information forming ideas or hypothesis testing and modifying these hypothesis and communication of the result”. As per Teręsa Ambile (1996), creativity has three elements (as given in figure-1.1)

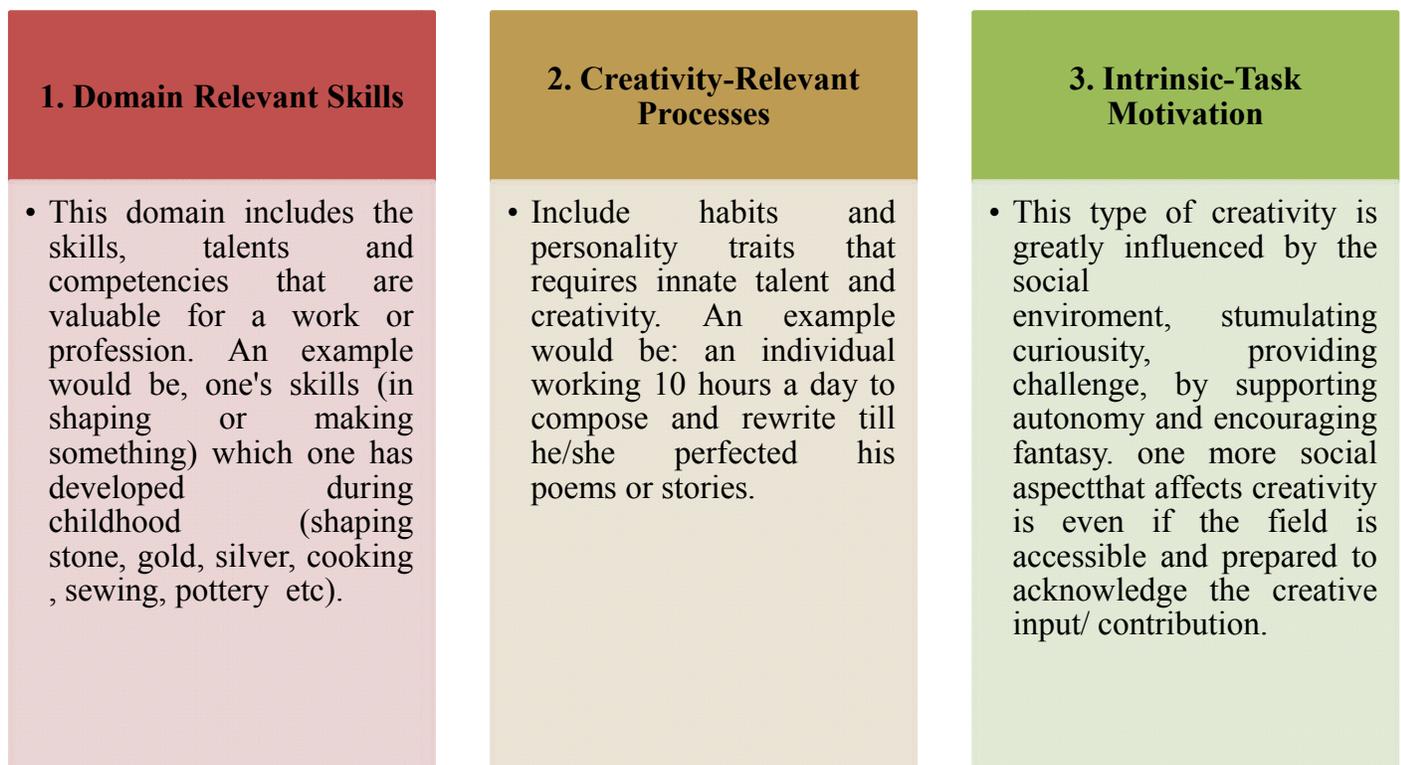


Fig. 1: Three Elements of Creativity

Creativity is recognized to be anextremeability of mankind. It is important to understand the nature of creativity. It has been explained differently by different philosophers and psychologists. Philosophically, a creative intellectual is one whose thinking is for an outcome that conforms to the criterion ofsignificance in one domain or a new. Plato made a difference between true art and artificial art. Artists compact only with exteriors and not realismthemselves. The real artists lead

into birth a few new existences. They are creative as they extend human consciousness. Some of the Psychologists equated creativity with mental health while some have related it to the development of personality. Psycho-analyst like 'Freud' constrained 'creativity to an interplay of unconscious and conscious mind'.

On the basis of above discussion following are the features or characteristics of creativity:

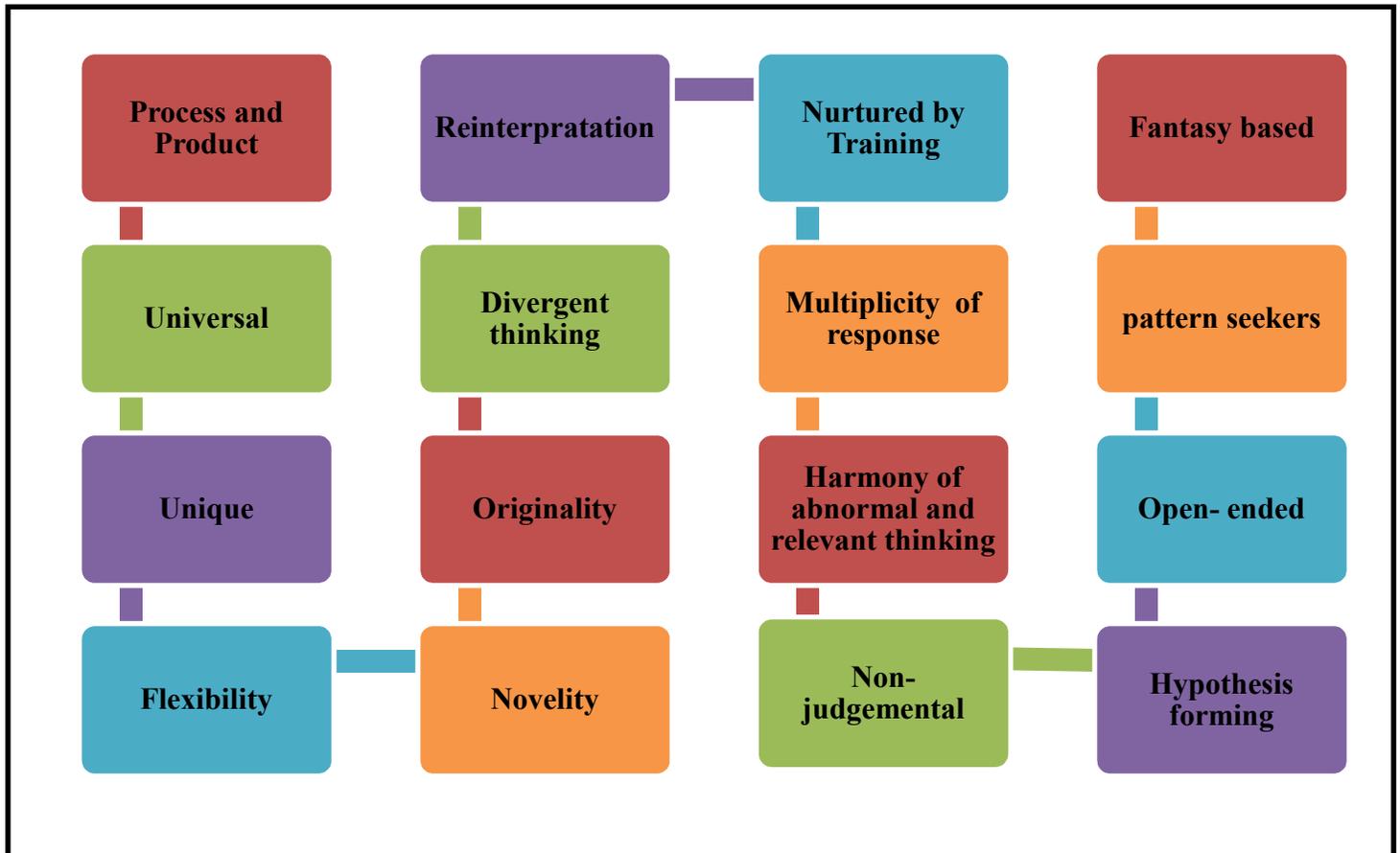


Figure-1.1: Characteristics of Creativity

The creative practice needs collaboration and time, so it is essential that students be given enough time to think divergently. For example flipped (Inverted) classroom approach can prove a boon both for teachers and students here as it provide learner's to do all the work related to their assignments at home and help them to discuss their queries with teachers in the classroom.

Procedure of Using PMI (Plus-Minus-Interesting)

A series of steps are followed to prepare the lesson plan using PMI strategy. As shown in below mentioned figure 1.2, in this procedure creative thinking process is implied (i.e. Preparation, Incubation, Illumination and Verification).

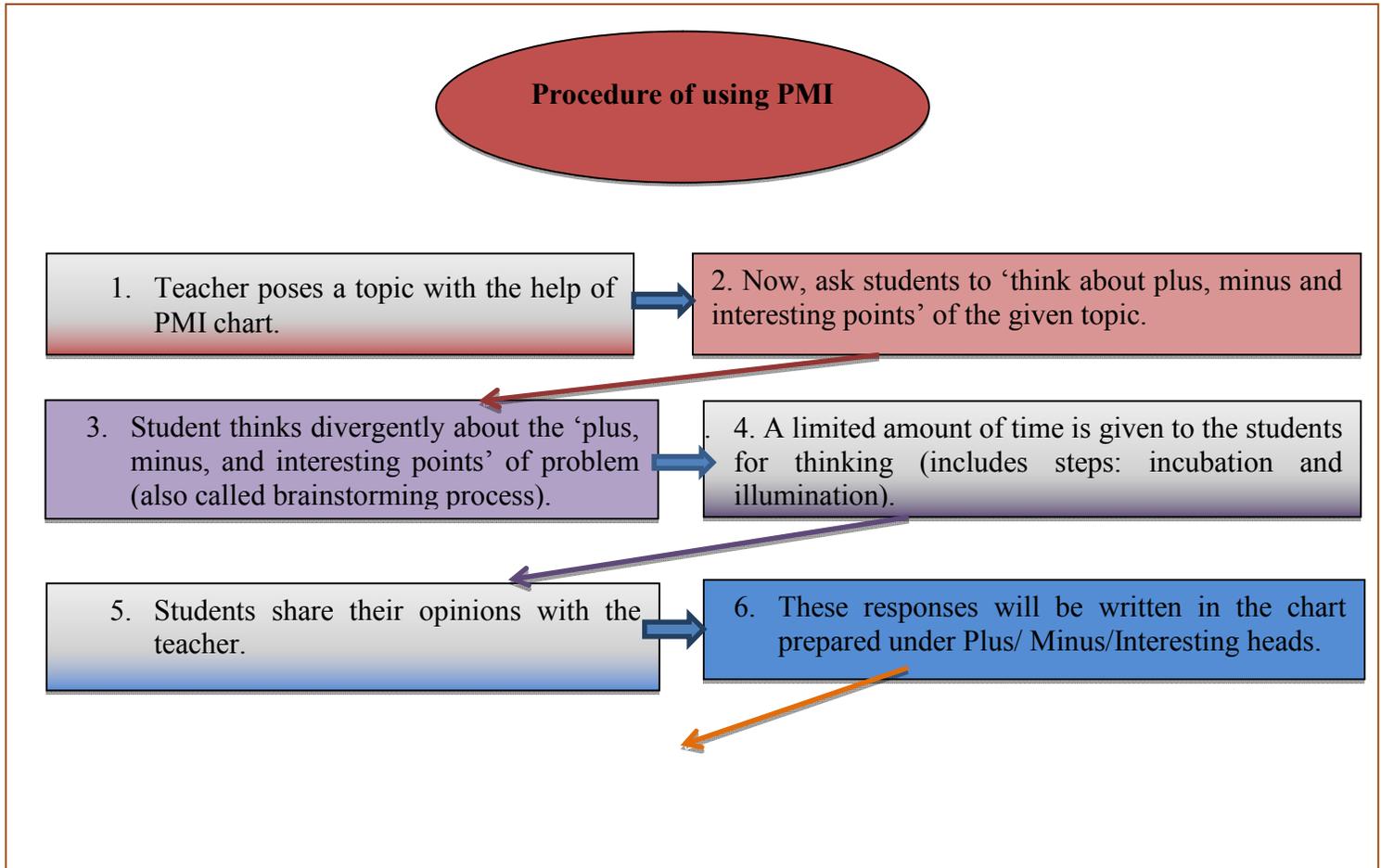


Figure-1.2: Procedure of PMI Strategy

PMI (Plus-Minus-Interesting) significantly enhances the decision making, creative thinking and critical thinking skills among learners. In this paper, an attempt has been made to know how this attention directed strategy i.e. PMI help in enhancing creative thinking among elementary school level students.

VARIABLES

Independent Variable: Plus-Minus-Interesting Strategy

Dependent Variable: Creative thinking

Intervening variables: Name of school, Class, Teacher, Subject to be taught, Duration of Treatment, Pupils intelligence

OBJECTIVES OF THE STUDY

The present research has been conducted to fulfill the following objectives:

- ❖ To develop lesson plans on Plus-Minus-Interesting (PMI) strategy.
- ❖ To study and compare a)The Pre-test scores; b) The Post-test scores; and c)Mean gain achievement scores on Creativity among control and experimental group of 7th graders.

HYPOTHESES OF THE STUDY

- ❖ There exists no significant difference in; a)The Pre-test scores b) The Post-test scores; and c)Mean gain achievement scores on Creativity among control and experimental group of 7th graders.

DESIGN OF THE STUDY

Methodology

In the present study, for comparing the two groups (control group and experimental group) “pre-test post-test control group quasiexperimental design” has been applied.

Tools used

A. Standardized Tools

1. Group Test of Intelligence by Ahuja(2012)
2. Socio-Economic Status Scale by Kalia and Sahu(2012)
3. Non-verbal Test of Creative Thinking by Baqer Mehndi (1973)

B. Self-made tool

1. Module prepare by the investigator on PMI strategy.

Sample

The sample was selected in two stages i.e. selection of schools and selection of learners. The school was purposively selected for the study from Rohtak District (Haryana). A sample of 60 students studying in 7th class from University Campus School of Rohtak was associated on the basis of intelligence by using Intelligence Test of Ahuja (2012) and socio-economic status by using SES Scale by Kalia and Sahu (2012). After comparing their intelligence and socio-economic status two groups were formed (experimental and control) consisting of 30 students in

each group. Both groups were equal in the terms of intelligence and socio-economic status. The results are shown in Tables given below:

Table1.1
't'-Value of Intelligence test scores of two groups

Groups	N	Mean Scores	S.D	S.E.M	't' value
Group 1	30	47.93	10.51	1.92	0.220(NS)
Group 2	30	48.50	9.38	1.71	

NS=Not significant

Table 1.1 indicates that the 't' value between the two groups is 0.220 which is not significant at 0.05 level. It means that no significant difference exists between the intelligence level of the two groups.

Table 1.2
't'-value of socio-economic-status Scale of two groups

Groups	N	Mean Scores	Standard Deviation	Standard Error of Mean	't' value
Group 1	30	65.43	12.76	2.33	0.410(NS)
Group 2	30	64.10	12.39	2.26	

NS=Not significant

Table 1.2 indicates that the 't' value between the two groups is 0.410 which is not significant at 0.05 level, it means that significant difference does not exist between the socio-economic-status of the two groups.

Stages of the experiment:

The experiment was conducted in three stages:

Table-1.3: Stages of Experiment

Stages of experiment	Groups	
	Experimental Group	Control Group

Pre-Test stage	Administration of Intelligence Test Administration of Socio –economic Scale Administration of Creative thinking Scale	Administration of Intelligence Test Administration of Socio –economic Scale Administration of Creative thinking Scale
Conducting the instructional programme/ Treatment Stage	Teaching Science through PMI strategy	Teaching Science through conventional method
Post- test stage	Administration of Creative thinking Scale	Administration of Creative thinking Scale

STATISTICAL TECHNIQUES

Keep in mind the nature, objective and design of the research the investigator were used the following statistical techniques:

- ❖ **Descriptive Statistics:** Measure of central tendency and measures of dispersion such as Mean and Standard Deviation (SD) was used to know the nature of data.
- ❖ **Inferential Statistics:** Critical ratio - “t-test” was used to see the difference between the pre-test and post-test scores and also between the groups taught through Think-Pair-Share Strategy.

RESULTS AND DISCUSSION

Table 1.4
‘t’ value for difference in the pre-test creativity scores of experimental group and control group

	Group	N	Mean	S.D	S.E.M	t-value	Level of significance
Pre-test	Control Group	30	188.23	16.77	3.11	0.96	Not significant
	Experimental Group	30	192.23	15.42	2.86		

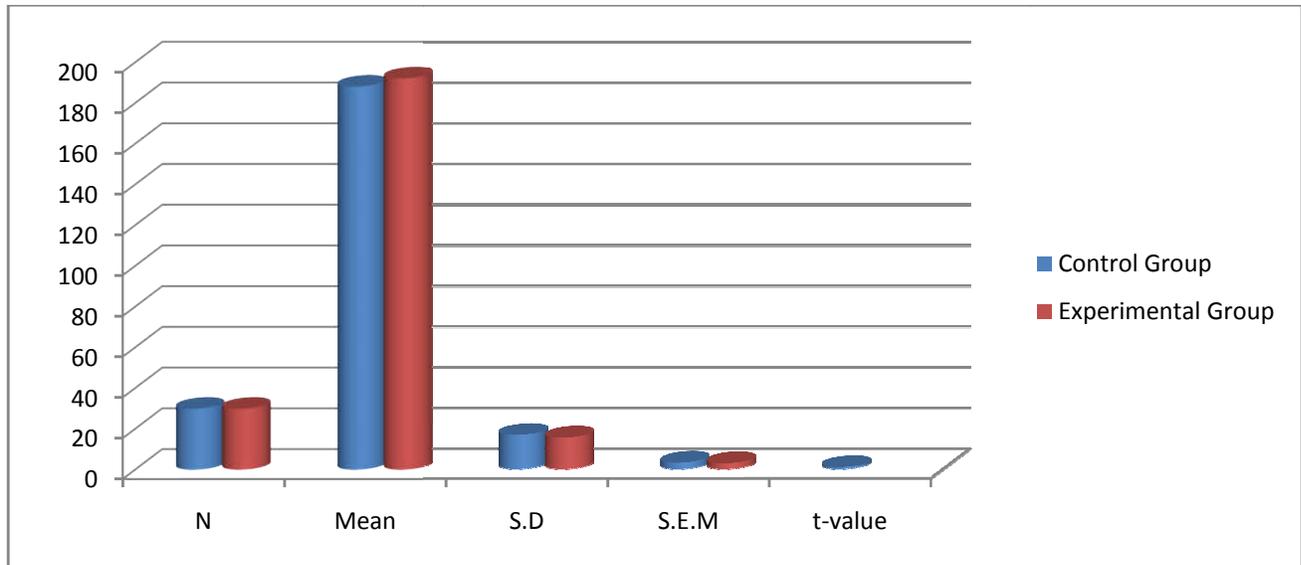


Fig.1.2: Bar graph illustrating the pre-test creativity scores of control group (Conventional Method) and experimental group (PMI strategy)

Table 1.4 indicates that the pre-test mean scores of control and experimental group are 188.23 and 192.23 respectively. The calculated t-value (0.96) is less than the table value at .05 level (1.96) of significance. This means that the null hypothesis is accepted. Thus, ‘There is no significant difference in pre-test scores of control group (Conventional method) and experimental group (PMI Strategy) on creative thinking before the treatment’ stands accepted.

**Table 1.5
t-value for difference in the post-test mean of creativity scores of experimental group and control group**

	Group	N	Mean	S.D	S.E.M	t-value	Level of significance
Post-test	Control Group	30	204.06	14.58	2.70	5.59	Significant at both the level.
	Experimental Group	30	228.63	19.16	3.55		

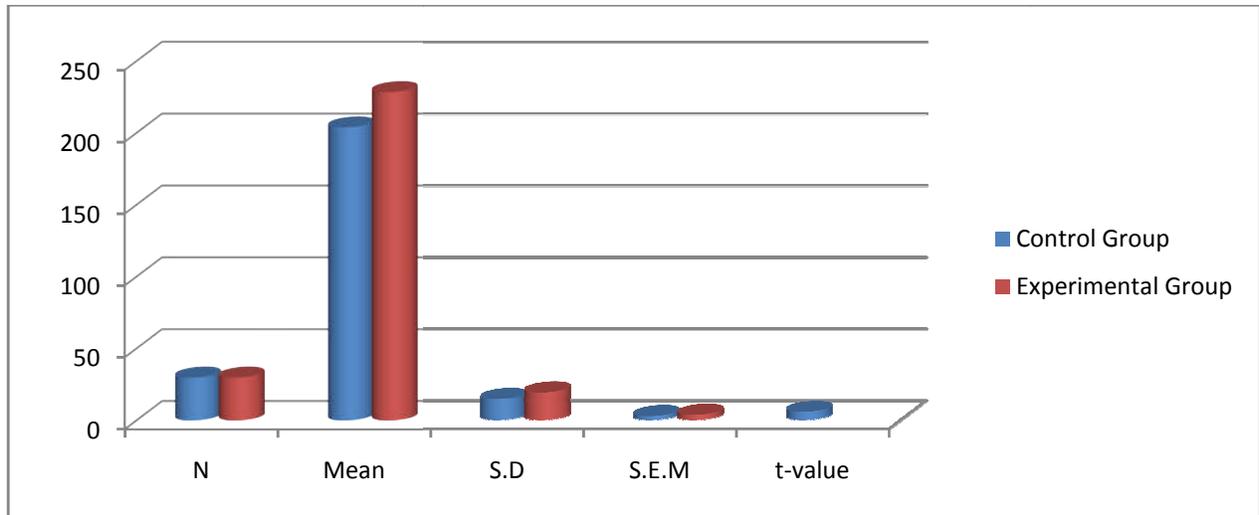


Fig.1.3: Bar graph illustrating the post-test mean of creativity scores of control group (Conventional Method) and experimental group (PMI strategy)

Table 4.2 indicates that the experimental group attained higher mean score ($M=228.63$) than the control group ($M=204.06$) in creativity test at post-test stage. It showed the calculated t-score of 5.59, which is more than the table value at .05 level of significance. The calculated value is higher than the tabulated value. Hence the null hypothesis is rejected. Thus, "There exists significant difference in post-test scores of control group (Conventional method) and experimental group (PMI Strategy) on creative thinking after the treatment" stands rejected. It implies that creative thinking scores of experimental group (PMI Strategy) was more than control group (Conventional Method). So finding indicates that PMI (Plus-Minus-Interesting) strategy more effective for enhancing creative thinking in comparison to the conventional method.

Table 1.6
't'-value for difference in the mean gain creativity scores of experimental group and control group

	Group	N	Mean	S.D	S.E.M	t-value	Level of significance
Mean Gain	Control Group	30	15.83	12.44	2.31	4.80	Significant at both the level.
	Experimental Group	30	36.4	19.94	3.70		

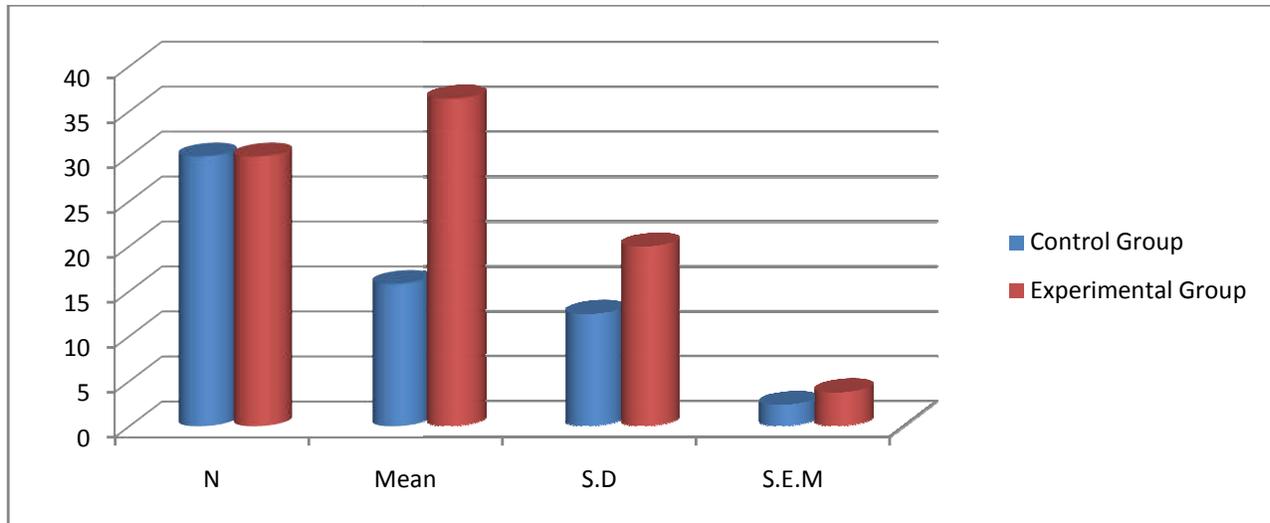


Fig.1.4: Bar graph depicting the mean gain creativity scores of control group (Conventional Method) and experimental group (PMI strategy)

Table 1.6 indicates that the experiment group attained higher mean gain score ($M=36.4$) than the control group ($M=15.83$). It showed from the figure 1.4 that the t-value (4.80) for difference in the mean gain creativity scores of experimental group and control group is significant at .05 level. This shows that the null hypothesis is rejected. Thus, the subjects exposed to PMI strategy gained significantly higher scores in comparison to that in conventional method. In other words, PMI strategy was found more effective in increasing the creative thinking of 7th grade learners.

Result summary:

Hypothesis	Testing of Hypothesis	Levels of Significance	Finding
H_{01}	Null hypothesis is Accepted/ Retained	Not significant at .05 (1.96) levels.	There exists 'no significant difference in pre-test scores' of control group (Conventional method) and experimental group (PMI Strategy) on creative thinking before the treatment.
H_{02}	Null hypothesis is Rejected	Significant at .05 (1.96) levels.	There exists 'significant difference in post-test scores' of control group (Conventional method) and experimental group (PMI Strategy) on creative thinking after the treatment. PMI strategy was found more effective in comparison of conventional methods for increasing the creative thinking of 7th class

			students.
Ho ₃	Null hypothesis is Rejected	Significant at .05 (1.96) levels.	There exists 'significant difference in mean gain scores' of control group (Conventional method) and experimental group (PMI Strategy) on creative thinking. PMI strategy was found more effective in increasing the creative thinking of 7th class students.

Results and Discussions

From the above result, it has been found PMI (Plus-Minus-Interesting) strategy is more effective to enhance the creative thinking of 7th grade students in science subject. Results of the study are in consonance with the findings of Supartinah, (2009) & Suryani, E. (2014) who reported that PMI is useful for improving students' speaking ability; student's motivation in joining lesson; self-confidence and improvement of critical thinking. The findings are further supported by Karuna, (2013) that PMI strategy plays a significant role in developing communication skill of senior high school students in English. Another study conducted by Sanpatchayapong, (2013) have clearly indicated that "PMI is helping students to assist them when reflecting on language skills and problems; to improve students' grammar; to help students learn how to ask questions; to encourage discussions in English".

Conclusion:

From the study conducted on 7th graders by using PMI it can be conducted effect of PMI strategy on creative thinking. It can be concluded that PMI (Plus-Minus-Interesting) strategy significantly and positively enhances the creative thinking of 7th grade students. This implies that PMI (Plus-Minus-Interesting) strategy in comparison to traditional teaching (lecture) plays a significant role in enhancing creative thinking. School teachers may start using PMI (Plus-Minus-Interesting) strategy to teach different subjects at different level. It will certainly provide teachers a new way of introducing creative inputs in this teaching learning process so that their classroom interaction became lively and more meaningful. Also, the students will participate in a proactive manner in classroom activities.

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Lesson Plan

Subject: Science

Topic: Water Resources

Class: 7th Time Duration:- 30 minutes

❖ Learning Outcomes: -

After the completion of this topic, the students will be able to:

- List sources of water
- Tell the formation of cloud
- Explain the process of evaporation
- Demonstrate the process of getting rain
- Compare the process of rain to same instance of daily life
- List positive, negative and interesting aspects of topic
- Develop awareness how to save water resources

Procedure:

Teacher's Activity	Student's Activity
<ol style="list-style-type: none"> 1. In the first step, the topic will be divided into parts i.e., an introduction to water, water cycle, sources of water, how to conserve water resources? 2. In second step, the teacher will explain one topic "an introduction to water". 3. After this, teacher will give some time to students to reflect on the topic. 4. Teacher will draw a chart on the blackboard having three columns under three headings <i>Plus, Minus, and interesting</i>. 5. Now, Teacher will ask signal out students one by one to tell the plus, minus, and interesting points of the topic. (It is possible that one student may give only plus points, other may give negative points, and others may give both. In addition to this, few more students give interesting points of the topic. There is also a possibility that few students may repeat the 	<ol style="list-style-type: none"> 1. Students will try to understand the topic as explained by the teacher. 2. They will try to think the answer of the questions raised by the teacher. They can also discuss among themselves to get the answer. 3. Students will also prepare the chart in their notebooks as similar to the chart drawn on blackboard by the teacher. 4. After preparing and understanding the chart, the students will provide their perceptions (positive, negative and interesting feedback) on the topic. 5. With the help of this technique, students will be able to think creatively and will be able to use this technique in daily life also. 6. After completing one topic, the teacher and students will move on to the next topic. Same procedure will be repeated and students will draw another chart for another topic in their notebook.

<p>Plus,Minus, and interesting points as given by other students).</p> <ol style="list-style-type: none"> 6. This will give an idea about how students could think divergently with this process of PMI strategy. 7. After completing one topic, the teacher will move on to introduce the next topic “water cycle”. And the same procedure will be repeated until the learning objectives have been achieved. This time teacher may choose students who were not signaled out before. Through this, it can be made sure that every student gets a chance to present their ideas. Also, it will keep every student engaged. 8. A teacher can allot 5-10 minutes for students to determine the plus, minus and interesting points of the topic. But no time limit can be decided for the teacher as he/she has to make sure that each and every student understands the topic in order for them to form their opinions. 	
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Topic 1:- Plus-Minus-Interesting Chart of An Introduction to Water

Plus Points	Minus Points	Interesting Points
Water is necessary for survival.	Dirty water creates water pollution.	It doesn't have a taste compared to other drinks e.g. orange juice.
There are many uses of water.	Excess drinking of water is harmful for us.	Water is colorless.
Water helps us in hydration.	Water has to be preserved for future.	Water is beneficial for agriculture.
Water helps in maintaining greenery.	Still water goes bad.	Water provides life to living organisms.
Water helps in generation of electricity.	Polluted water causes many diseases such as cholera.	Water is maintained by water cycle.

No life without water, it is essential for all living beings		Water exists in three forms- solid, liquid and gas.
Natural resources, easy to obtain and lower cost		