



“The Synectic’s Model as a Stimulus for Fostering Scientific Creativity among Secondary School Students in the Field of Science”

Ms. Nandini UC

Research Scholar

Vijayanagar Sri Krishnadevaraya University, Ballari

Dr. Sushma N Jogan

Research Supervisor

Vijayanagar Sri Krishnadevaraya University, Ballari

Abstract:

The Synectic model is an effective educational approach that boosts scientific creativity by prompting students to engage in imaginative thinking. This model highlights the significance of utilizing current knowledge in fresh ways to produce original solutions, creating a space conducive to nurturing creativity. It urges students to creatively apply their existing knowledge, resulting in inventive achievements in science education. The primary objective of this research is to assess the efficacy of the Synectic model in enhancing scientific creativity among students studying science subjects. The study employs a quasi-experimental pre-test-post-test research design as its methodology. The research sample includes 120 participants from English medium schools across two distinct educational institutions, with an equal representation of 60 students from private and public-school sectors, respectively. Employing purposive sampling techniques in the Ballari district of Karnataka state, 30 students were selected from the traditional learning group and the 30 learners chosen from Synectic’s model learning group within each academic institution. Data collection took place during the second semester of the ninth grade, spanning from November 2024 to January 2025. Sharma and Shukla developed a verbal test of scientific creativity. The internal reliability of this instrument was found to be robust, demonstrating a coefficient alpha of 0.98. Academic attainment in the domain of science was evaluated through a standardized test devised by the researcher, showing a test-retest reliability of 0.85. Synectic’s model learning material developed by researcher. research shows a difference in learning outcomes between two groups of students. Specifically, those who were taught using the Synectic’s model demonstrated improved scientific creativity. The study revealed that students in the Synectic’s group showed significant progress in their post-test results compared to their pre-test scores. Moreover, there was a noticeable gender gap affecting academic performance and scientific creativity. Proficiency in scientific creativity is crucial for students to effectively address developed novelty among learners. To support students

in developing these skills, educators should consider implementing a verbal test of scientific creativity scale across all educational levels.

Key terms: Synectic's model teaching method, academic attainment and scientific creativity

Introduction

In the modern era of the 21st century, education has evolved to equip students with the necessary knowledge and skills to thrive in the global economy. Enhancing the quality of education is essential to rise to this demand. A shift from Teacher Centered Learning (TCL) to Student Centered Learning (SCL) is crucial in improving the quality of education, especially in subjects like science (Nichols, 2017). In order to become a self-reliant learner, it is crucial to adopt a suitable learning strategy (Okpara, 2007). Implementing a learning method involves utilizing a student-focused approach along with the Synectic's model. This model, known as an information processing model, facilitates the learning process, enabling students to fulfil their duties and making teaching more innovative, ultimately enhancing their quality of life (Ramadhani et al, 2017). Synectic's is a method of fostering creative thinking that revolves around comprehending apparent differences collectively. Analogies and metaphors are its primary means. Frequently utilized by groups, this approach aids in nurturing students' ability to generate creative solutions. (Rubi Mian, 2024)

The Synectic teaching method is designed to inspire creativity in students by engaging them in activities that stimulate divergent thinking and encourage the exploration of new ideas. This approach not only helps to develop their creative problem-solving skills but also bolsters their confidence in their ability to think innovatively. Moreover, the collaborative aspect of Synectic cultivates a supportive academic environment where students can exchange ideas and expand on each other's creativity. By incorporating the Synectic approach into the educational curriculum, teachers can equip students with the necessary tools and mindset to thrive in a world that is increasingly intricate and ever-changing. (Agilandeshwari and Naga Subramani, 2024) It involves combining varied and apparently inconsequential elements to generate innovative concepts. This creative process hinges on an individual's cognitive ability to identify and connect disparate and unrelated subjects. (Gordon, 1961)

In the field of science, learning involves observing, conducting experiments, and fostering a collaborative learning atmosphere. This approach helps students grasp the material more easily, develop a positive outlook on learning, and enhance their creative thinking skills (Eristi & Polat, 2017). Innovation and imaginative thinking are crucial for societal advancement and enhancing the quality of life. Hence, there is a necessity to guide students towards fostering creative thought. Efforts towards cultivating and encouraging creative thinking within educational environments. Consequently, there is considerable uncharted territory and tasks to be undertaken in this developing area. Creativity is characterized as the capacity to introduce novel concepts; it is marked by freshness, uniqueness, and broadly innovative nature. The concept of creativity has been examined by Guilford (1956).

Creative thinking plays a fundamental role in how individuals approach scientific concepts. Therefore, it is crucial to incorporate this skill into science education, as highlighted by (Chan 2007). The school setting

is expected to significantly influence the development of students' creative abilities. Schools provide numerous opportunities to foster creative thinking and accomplishments across various areas. Consequently, efforts to boost the creativity of students focus on employing effective teaching methods that encourage critical and divergent thinking, thereby nurturing their comprehension and creative thinking skills. (Medar Mahadev somappa ,2020) Enhancing students' creative abilities can greatly enhance their adaptability and capacity to manage changes in both their personal and professional spheres. It is crucial to integrate a focus on fostering student creativity into educational goals and curriculum design. (Morten & Vanessa 2007)

Creativity, identified as the most sophisticated cognitive process, involves generating unconventional and distinct ideas that are relevant to the current circumstances. Unlike intelligence, creativity is recognized as a separate and independent entity; however, it diverges from intelligence by encompassing more than just cognitive or intellectual processes. It is characterized by a complex interplay of motivational factors, unconventional personality traits, environmental influences, serendipitous events, and eventual outcomes. (Michalko,1998) Creativity plays a vital role across academic fields and endeavors, serving as a pivotal element in the comprehension of educational experiences. The ability to engage in creative thinking is a prerequisite for fostering innovation. By nurturing creativity, students enhance their capacity to grasp complex concepts, take ownership of their learning process, and devise solutions to unfamiliar challenges. (Lymbery, M.E.F ,2003)

Critical thinking is the cognitive ability that empowers students to utilize their creativity in formulating ideas, inquiries, and hypotheses, exploring different possibilities that significantly enhance their academic achievements. The strength of the creative process lies in its demand for expertise and insight into the subject under scrutiny, along with a readiness to challenge established knowledge. Students should be skilled in posing constructive and debatable inquiries to aid in shaping their comprehension, with the element of imagination being pivotal. Consequently, it is imperative for educators to establish an environment conducive to fostering creative thinking in students. Upon reviewing relevant literature, various instructional strategies are identified as conducive to cultivating creativity and innovation. (Kampylis, P. and Berki, E ,2014 & Moss, B.R. 2011) Enhancement of self-efficacy fosters a secure educational setting conducive to nurturing student creativity.

Creativity plays a vital role in nurturing critical thinking and divergent thought processes through the utilization of metaphorical exercises. This methodology serves to amplify students' capacity for producing novel and inventive concepts. In the realm of contemporary educational requirements, innovative pedagogical approaches are essential to cultivate creative thinking, a pivotal element in both individual growth and societal advancement. (Ayagul Serikbayeva and Lyazzat Beisenbayeva ,2020) creativity encourages students to express ideas freely, enhancing their ability to tackle challenges collaboratively (Yulia Pramusinta and Farah Destria Rifanah,2020) Promoting a sense of belonging among students and bolstering self-assurance. It facilitates the evolution of daily tasks, enabling both individuals and teams to cultivate fresh perspectives and inventive concepts. (Mujibul Hasan Siddiqui ,2011)

Creativity promotes divergent thinking, allowing students to produce fresh and original concepts. (Senawee Roekmongkol and Thanatcha Rattanaphant,2022) Creativity plays a vital role in education as it equips students with essential skills to navigate a multifaceted future, such as enhancing critical thinking, problem-solving, and adaptability. By enhancing student engagement, creativity not only enhances academic achievements but also nurtures a growth mindset, emotional well-being, and the capacity to synthesize information across various disciplines. The integration of creativity into educational programs is imperative in cultivating forward-thinking individuals capable of addressing upcoming challenges and thriving in a constantly evolving professional environment.

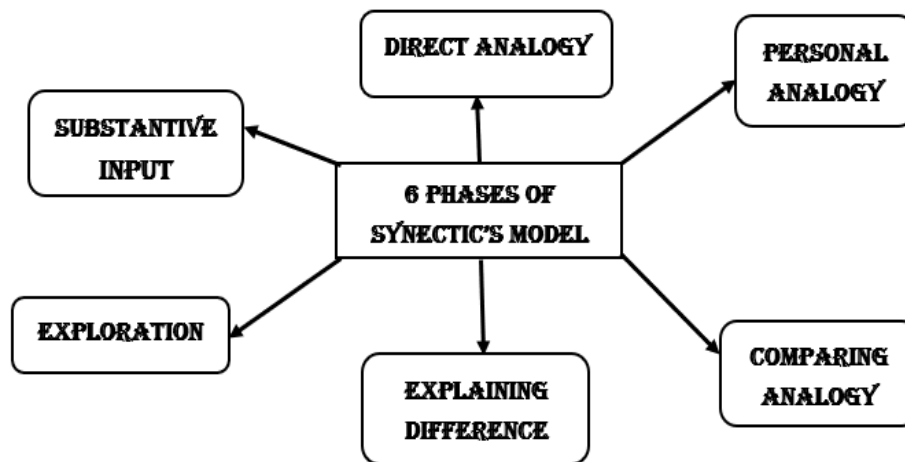


Figure 1: 6 Phases of Synectic's model

(Gunter, Estes and Schwab 2007) described the phases of the of the Synectic's Model which are:

1. **Substantive Input:** The teacher shares new information with students.
2. **Direct Analogy:** The teacher suggests using a clear analogy and encourages students to explain their grasp of it.
3. **Personal Analogy:** The teacher guides students to apply the analogy in a personal way.
4. **Comparing Analogy:** Students need to recognize and explain the similarities between the new information and the analogy.
5. **Explaining Difference:** Students must identify when the analogy doesn't fit. During the Exploration stage, students return to the original topic considering its distinct features.

Literature survey:

The Synectic learning framework facilitates the development of metaphorical cognition, enhancing scientific creativity proficiency and mastery of educational content. (M. Huda,2019) The Synectics framework represents a notable strategy for cultivating scientific creativity by placing emphasis on the utilization of analogies and metaphors to elevate advanced cognitive abilities. This review of academic sources integrates outcomes from diverse investigations, accentuating the efficacy of Synectics within educational environments and its contribution to the cultivation of innovative problem-solving proficiencies in students. Through the employment of analogy and metaphorical reasoning, the Synectic model enriches scientific creativity by nurturing elevated cognitive skills. It assists learners in generating inventive concepts,

rendering abstract notions more tangible, and promoting meaningful knowledge acquisition spanning multiple academic domains (Rufaida et.al, 2022).

The efficacy of the Synectic's instructional approach in fostering creativity among seventh-grade students within the domain of science education has been evidenced through notable enhancements in innovative outputs when juxtaposed with conventional pedagogical practices. (Ali Yousefi ,2014). The Synectic's model plays a significant role in fostering scientific creativity by serving as a framework that employs diverse strategies and approaches to augment creative cognitive abilities in the context of science education (Huraiza Mahmudah and Jumadi Jumadi,2023) This study explores the cultivation of scientific innovation utilizing the Synectics model, underscoring its significance in augmenting students' capacity for creative cognition. It elucidates methodologies for transmuting established notions into novel concepts and fostering cooperative endeavors within the realm of science pedagogy. (Tomo Djudin,2017)

The Synectic's model is introduced as a strategy aimed at enhancing creativity within the realm of science education, with an emphasis on the generation of novel concepts and innovations derived from preexisting information. The concept of creativity underscores its pivotal function in problem resolution and underscores the significance of originality within creative endeavours' application of creativity in pedagogy involves the utilization of various methodologies aimed at fostering students' divergent thinking abilities. (Tomo Djudin,2017) The efficacy of the Synectics model in cultivating a creative mindset, characterized by attributes such as inquisitiveness and receptivity to novel encounters, is under scrutiny. (Iin Mahlia Fitriana et.al ,2024)

Prominent markers of creative cognitive abilities, namely fluency, flexibility, originality, and elaboration, are examined, with particular emphasis placed on the pivotal significance of flexibility and originality as determinants of achievement. The development of creative thinking skills in the field of science is emphasized, with a focus on capabilities such as inquiring effectively, producing innovative concepts, and creatively resolving issues. (Reza Fahmi and Jumadi Jumadi ,2023) Educators are encouraged to give precedence to incorporating the synectics strategy into their educational programs to foster creativity. Research findings suggest that the utilization of the synectics strategy significantly contributes to the holistic enhancement of creativity in students The implementation of the synectics strategy is fundamentally important in fostering the comprehensive growth of creativity in students. (Sumaiah Eid ALZABOOT,2024)

The Synectic's learning model is recognized as a valuable method for fostering creativity by enabling students to freely articulate their thoughts and participate in collaboratively (Yulia Pramusinta and Farah Destria Rifanah,2020) The significance of fostering creativity in education is essential as a pivotal component for implementing successful learning methodologies. Creativity is a notable attribute that can greatly improve the educational experience within academic institutions. (Lidwina Felisma Tae et.al ,2018) It highlights the necessity of employing collaborative methods to promote creativity among students within academic environments. (Zhang Song,2010)

Synectics promotes critical and divergent thinking, both of which are fundamental elements of fostering creative ideas. Creativity plays a crucial role in the development of new ideas, advancements, and societal advancements, influencing both individuals and institutional frameworks. The Synectics model emphasizes the importance of balancing divergent and convergent thinking for optimal creativity, with technology serving as a valuable tool to aid in this dynamic. (Umer Farooq et.al ,2005)

The current study:

Five questions lead the current study:

RQ1. Do the mean scores on the pre-test and post-test show a significant difference between the conventional method learning group and the Synectic's method learning group when considering a specific variable?

i) Academic attainment ii) Scientific creativity

RQ2. Is there a substantial difference in the mean scores pre- and post-engagement with the Synectic's method learning group?

i) Academic attainment ii) Scientific creativity iii) Gender wise academic attainment iv) Gender wise Scientific creativity

RQ3. Is there a significant correlation between scientific creativity and academic attainment observed among individuals engaged in the Synectic model learning group during the post-evaluation phase?

RQ4. Is there a notable difference in the academic attainment of high school students in science based on the instructional approach utilized, such as the (Synectics model of learning versus a traditional method)?

RQ5. Is there a substantial influence on the scientific creativity of high school students by the instructional approach, such as the (Synectics model of learning versus a traditional method)?

Method:

Participants

The research methodology utilized in this investigation adopts a quasi-experimental pre-test-post-test design. The sample population comprises 120 individuals enrolled in English medium schools across two distinct institutions, with 60 students from both private and public-school sectors. Through purposive sampling techniques in the Ballari district of Karnataka state, 30 learners were selected from both the conventional method learning group and Synectic's method learning group within each educational setting. Data collection occurred during the second semester of the ninth-grade spanning from November 2024 to January 2025

Measures

1) Scientific creativity through a verbal test was developed from (V.P. Sharma and J.P. Shukla). The internal consistency of this assessment tool was reported to be high, with a coefficient α of 0.98.

2) Synectic's model learning material developed by researcher.

3) Academic attainment in science was measured using standardized test developed by researcher. The reliability of the test was 0.857

Results

RQ1. Do the mean scores on the pre-test and post-test show a significant difference between the conventional method learning group and the Synectic's method learning group when considering a specific variable?

i) Academic attainment

ii) Scientific creativity

Table 1.1

The table shows the mean pre-test results among CMLG and SMLG

Group	Variable	N	Mean	SD	Df	t-value	p-value	Hypothesis Supported
CMLG	Academic attainment	30	15.95	3.466	59	1.895	0.063	No
SMLG		30	16.78	3.031				
CMLG	Scientific creativity	30	311.82	18.486	59	1.813	0.075	No
SMLG		30	316.97	15.358				

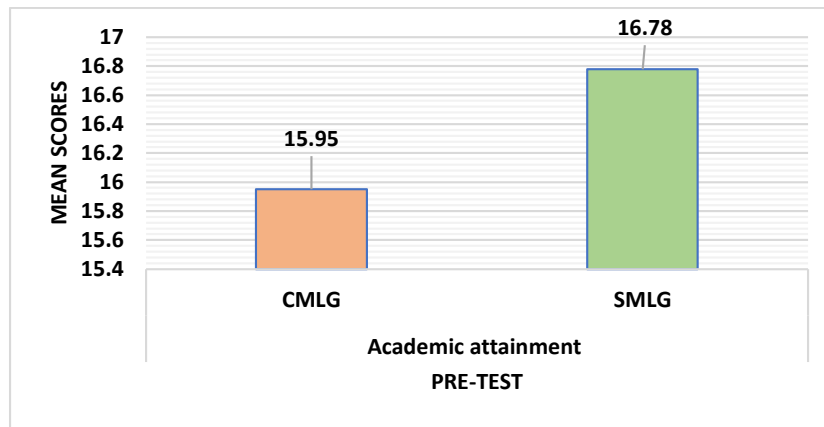
* $p < 0.05$

The purpose of the research is to ascertain whether venting differs among groups. The hypothesis was that in pre-test there would be discernible difference in academic attainment between SMLM and CMLG. Based on Table 1.1, the mean and SD where $M = 15.95 < 16.78$ and $SD = 3.466 > 3.031$ SMLG > CMLG with 59 df, $t = 1.895$ and $p = 0.063 > 0.05$ los, the above formulated research hypothesis is rejected.

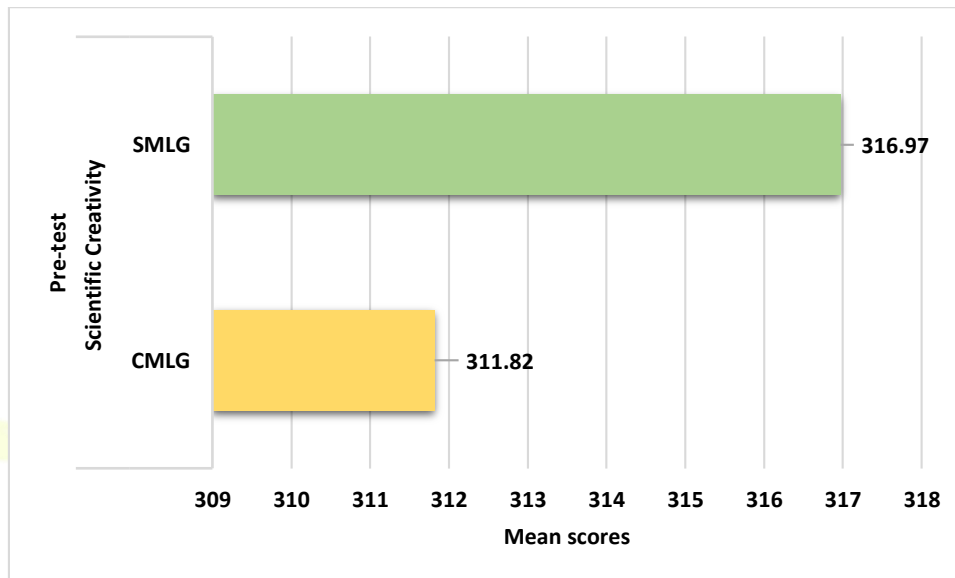
It consequently can be restated that there was not a statistically significant distinction in the academic attainment before -test scores.

The aim of this research is to determine if there are differences in flaring among groups. The pre-test was intended to reveal a discernible distinction in SMLM and CMLG scientific creativity. The aforementioned study hypothesis is dismissed based on Table 1.1, where the mean and SD are displayed as follows $M = 311.82 < 316.97$ and $SD = 18.486 > 15.358$ SMLG > CMLG with 59 df, $t = 1.813$ and $p = 0.075 > 0.05$ los. Therefore, it may be restated that the scientific creativity pre-test outcomes did not show a statistically significant variance.

Graph 1.1



Average scores on CMLG and SMLG pre-test for academic attainment



Average scores on CMLG and SMLG pre-test for scientific creativity

Table 1.2

The table shows the mean post-test results among CMLG and SMLG

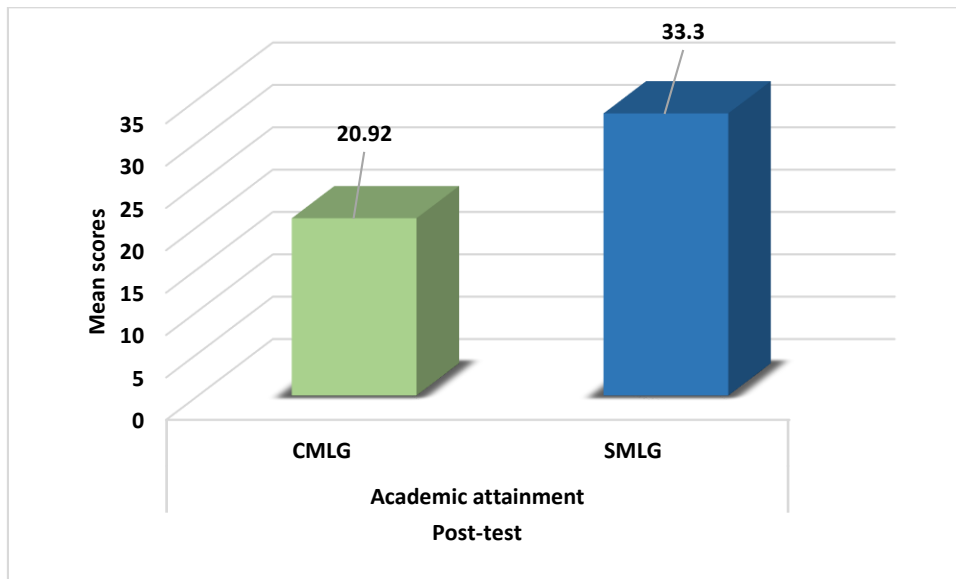
Group	Variable	N	Mean	SD	df	t-value	p-value	Hypothesis Supported
CMLG	Academic attainment	60	20.92	4.114	59	14.550	0.000*	Yes
SMLG		60	33.30	7.041				
CMLG	Scientific creativity	60	325.35	18.202	59	3.905	0.000*	Yes
SMLG		60	336.83	16.605				

It had been predicted that SMLM and CMLG's academic attainment would differ significantly in the post-test. Table 1.2 indicates the mean and SD, which are $M = 20.92 < 33.30$ and $SD = 4.114 < 7.041$ SMLM $>$ CMLG. previously stated research hypothesis was retained with 59 df, $t = 14.550$, and $p = 0.000 < 0.05$ los

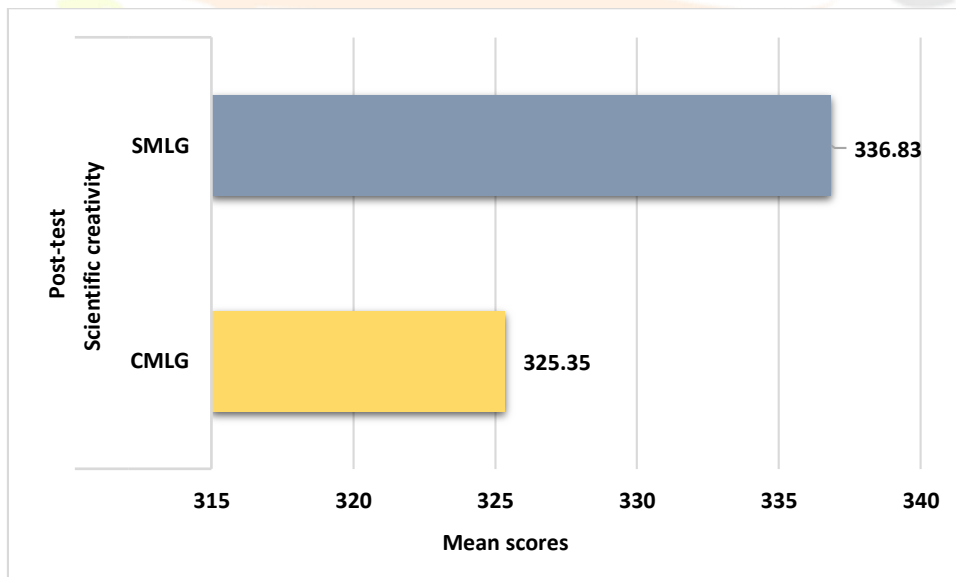
The aim of this research is to determine if there are differences in flaring among groups. The post-test was intended to reveal a discernible distinction in SMLM and CMLG scientific creativity. The aforementioned

study hypothesis is accepted based on Table 1.2, where the mean and SD are displayed as follows $M = 325.35 < 336.83$ and $SD = 18.202 > 16.605$ SMLG > CMLG with 59 df, $t = 3.905$ and $p = 0.000 < 0.05$ los

Graph 1.2



Average scores on CMLG and SMLG post-test for academic attainment



Average scores on CMLG and SMLG post-test for scientific creativity

RQ2. Is there a substantial difference in the mean scores pre- and post-engagement with the Synectic's method learning group?

- i) Academic attainment
- ii) Scientific creativity
- iii) Gender wise academic attainment
- iv) Gender wise Scientific creativity

i) Academic attainment

Table 1.3

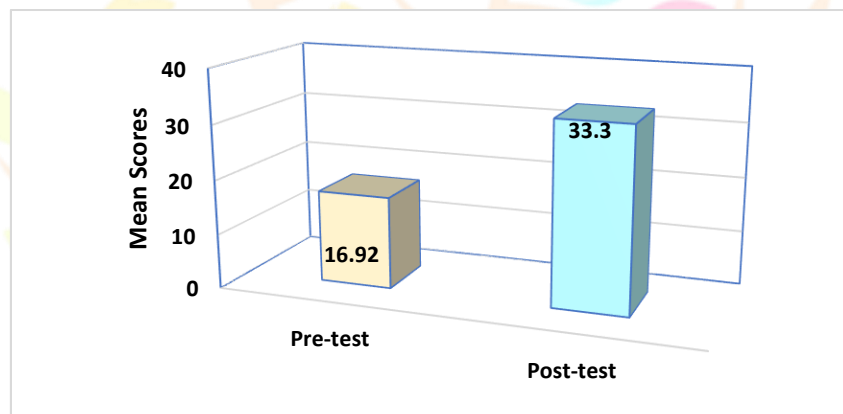
Synectic's model learning group initial and final test scores are presented.

Group	Test	N	Mean	SD	df	t-test	p-value	Hypothesis supported
SMLG	Pre-test	60	16.92	3.356	59	23.208	0.000*	Yes
	Post-test	60	33.30	7.041				

* $p < 0.05$

The goal of the investigation is to ascertain whether flaring differs among tests. With a mean and SD of $M = 16.92 < 33.30$ and $SD = 3.356 < 7.041$ post-test $>$ pre-test with 59 df, $t = 23.208$, and $p = 0.000 < 0.05$ los, Table 1.3 was employed to verify the hypothesis that there would be a substantial variance in SMLG academic attainment between the pre and post-tests. The research prior hypothesis remains acceptable.

Graph 1.3



Mean outcomes on academic attainment pre -post test of Synectic's model learning group

ii) Scientific creativity

Table 1.4

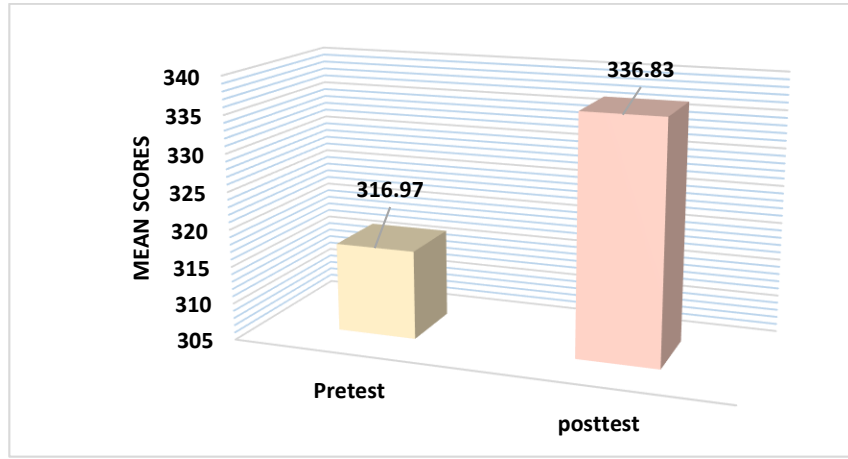
Synectic's model learning group initial and final test scores are presented.

Group	Test	N	Mean	SD	df	t-test	p-value	Hypothesis supported
SMLG	Pre-test	60	316.97	15.358	59	12.754	0.000*	Yes
	Post-test	60	336.83	16.605				

* $p < 0.05$

The data table 1.4 above demonstrated that in SMLG scientific creativity. $M = 316.97 < 336.83$ and $SD = 15.358 < 16.605$ were the pre-post test mean scores. The post-test $>$ pre-test with 59 df, a t-value of 12.754, and a p-value of 0.000 are less than 0.05 los, indicating a statistically significant distinction between them prior mentioned research hypothesis is retained.

Graph 1.4



Average pre-post test scores for scientific creativity in the Synectic’s model learning group

iii) Gender wise academic attainment

Table 1.5

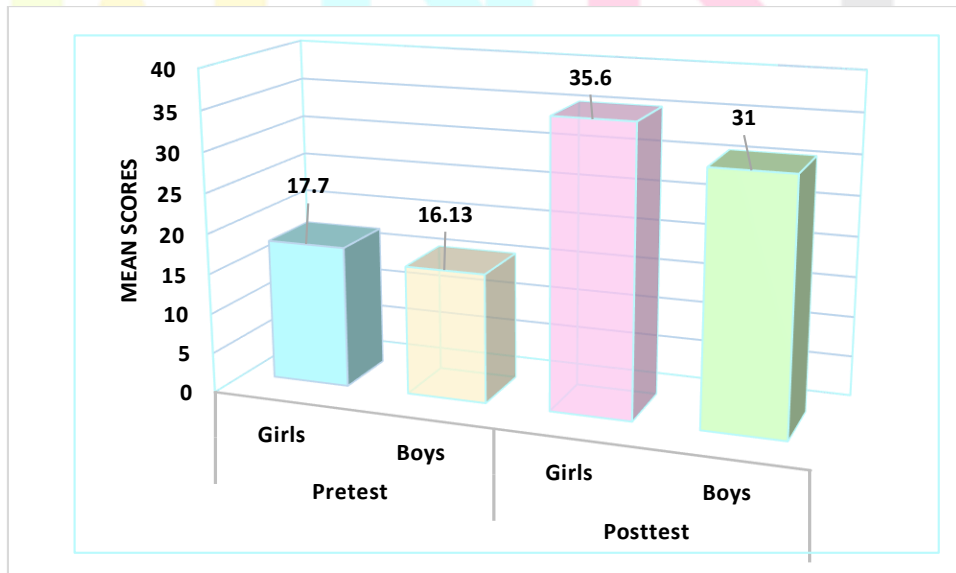
Pre-and post-test results are provided for the Synectic’s model learning group based on gender.

Group	Test	Gender	N	Mean	SD	df	t-value	p-value	Hypothesis Supported
SMLG	Pre-test	Girls	30	17.70	3.271	29	2.072	0.047*	Yes
		Boys	30	16.13	3.309				
	Post-test	Girls	30	35.60	6.616		3.353	0.002*	Yes
		Boys	30	31.00	6.792				

*p<0.05

The preceding table 1.5 indicated that in SMLG academic attainment girls performed better than boys on the pre-test, with $M=17.70 > 16.13$ and $SD=3.271 < 3.309$. As demonstrated by the 29 df, t-value of 2.072, and p-value of 0.0047, which are all below the 0.05 Level of significance, there is a significant difference between them in the pre-test. On the post-test, girls perform better than boys $M=35.60 > 31$, $SD=6.616 < 6.792$. With 29 df, a t-value of 3.353, and a p-value of 0.002, which is less than 0.05 los, they differ significantly in the post-test

Graph 1.5



Average academic attainment test results for the group employing the Synectic's model learning group before and after in terms of gender.

iv) Gender wise scientific creativity

Table 1.6

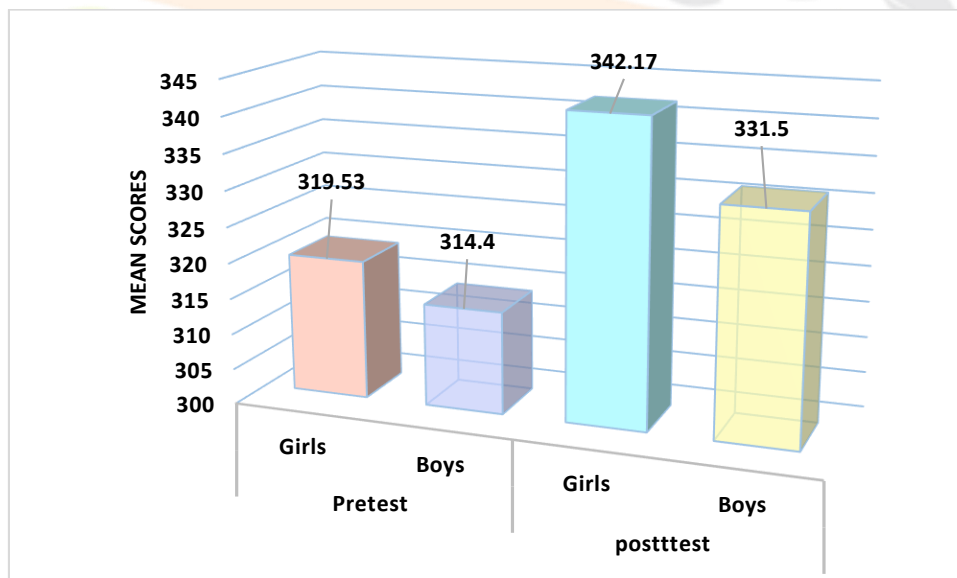
Results of the pre and post-tests for the Synectic model learning group are shown based on gender.

Group	Test	Gender	N	Mean	SD	df	t-value	p-value	Hypothesis Supported
SMLG	Pre-test	Girls	30	319.53	16.186	29	1.533	0.136	No
		Boys	30	314.40	14.292				
	Post-test	Girls	30	342.17	16.865		3.302	0.003*	Yes
		Boys	30	331.50	14.755				

* $p < 0.05$

The previous table 1.6 in SMLG scientific creativity showed that $M=319.53 > 314.40$ and $SD=16.186 > 14.292$. The t-value of 1.533, the p-value above 0.05, and the 29 df all show that the difference between the boys and girls on the pre-test is not statistically significant. Girls outperform boys on the post-test ($M=342.17 > 331.50$, $SD=16.865 > 14.755$). They differ considerably in the post-test, with 29 df, a t-value of 3.30, and a p-value of 0.003, all of which are below the 0.05 level of significance.

Graph 1.6



Pre and post-test mean scores for the Synectic model learning group's scientific creativity by gender.

RQ3. Is there a significant correlation between scientific creativity and academic attainment observed among individuals engaged in the Synectic model learning group during the post-evaluation phase?

Table 1.7**Post-test mean scores of SMLG**

Variables		Scientific creativity	academic attainment
Scientific creativity	Pearson correlation	1	0.561**
	Sig.(2-tailed)		0.000
	N	60	60
Academic attainment	Pearson correlation	0.561**	1
	Sig.(2-tailed)	0.000	
	N	60	60

** correlation is significant at the 0.01 level (2-tailed)

The above table displays that the 0.001 Level of significance, there is a significant positive correlation between scientific creativity and academic attainment in a Synectic's model learning group when n=60, $r=0.56$, and the resultant p-value is lesser the critical values.

Findings: Consequently, this previously mentioned research hypothesis is retained.

RQ4. Is there a notable difference in the academic attainment of high school students in science based on the instructional approach utilized, such as the (Synectics model of learning versus a traditional method)?

Table 1.8**Considerable impact among instructional method and academic attainment in science**

Variable	Sum of squares	df	Mean square	F-value	P-value	Hypothesis Supported
Intercept	3722.046	1	3722.046	8549.396	0.000	Yes
Main effect						
Interactional method (CML and SML)	2.027	1	2.027	4.655	0.033	
Academic attainment	3.103	5	0.621	1.426	0.221	
Interaction effect						
Instructional method(CML and SML) *academic attainment	3.233	2	1.616	3.713	0.027	
Error	48.325	111	0.435			
Total	7560.00	120				

R Square =0.317 (adjusted R Squared =0.268)

From the above table displays that the main effect of instructional method (CML and SML) can be observed from the obtained F-value is 4.655 and the p-value is 0.03

Inference : the obtained t-value is lesser than the 0.05 LOS thus the above stated research hypothesis is accepted.

In the same way the main effect of academic attainment can be observed from the obtained F-value is 1.426 and the p-value is 0.221

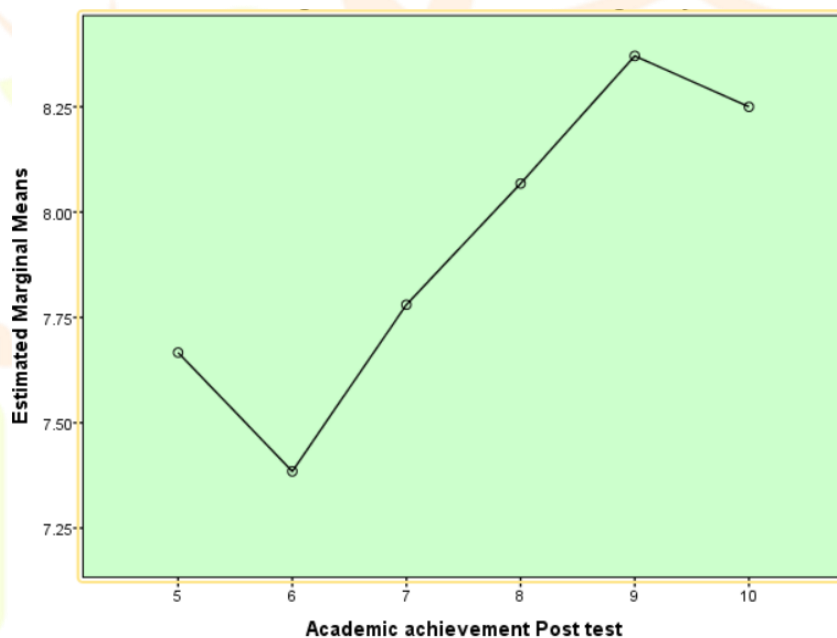
Inference: The obtained t-value is greater than the 0.05 level of significance thus the above stated research hypothesis is rejected

The interaction effect between instructional method and academic attainment among secondary school students can be observed from the obtained F-value is 3.713 and p-value is 0.027.

Inference : The obtained t-value is lesser than the 0.05 level of significance.

this shows the significance effect between instructional method (CML and SML) and academic attainment in science

Conclusion:The above stated research hypothesis is retained.



Research Through Innovation

RQ5 Is there a substantial influence on the scientific creativity of high school students by the instructional approach, such as the (Synectics model of learning versus a traditional method)

Table : 1.9

Considerable impact among instructional method and scientific creativity

Variable	Sum of squares	df	Mean square	F-value	P-value	Hypothesis Supported
Intercept	4353.133	1	4353.133	6098.321	0.000	Yes
Main effect						
Interactional method (CML and SML)	34.372	1	34.372	48.152	0.000	
Scientific creativity	37.841	41	0.923	1.293	0.178	
Interaction effect						
Instructional method (CML and SML)* Scientific creativity	20.072	15	1.338	1.875	0.044	
Error	44.247	62	0.714			
Total	7549.000	120				

R Square =0.740 (adjusted R Squared =0.500)

The above table revealed that the main effect of instructional method (CML and SML) can be observed from the obtained F-value is 48.152 and the p-value is 0.000

Inference: the obtained t-value is lesser than the 0.05 LOS thus the above stated research hypothesis is accepted.

The main effect of scientific creativity can be observed from the obtained F-value is and 1.293 the p-value is 0.178

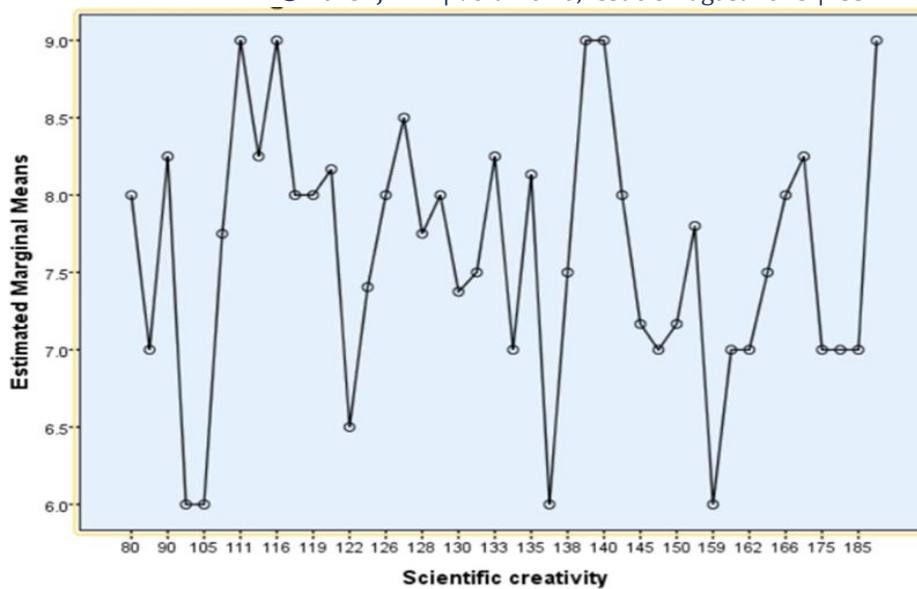
Inference: The obtained t-value is greater than the 0.05 level of signifiacnce thus the above stated research hypothesis is rejected

The interaction effect between instructional method (CML and SML) scientific creativity among secondary school students can be observed from the obtained F-value is 1.875 and p-value is 0.044

Inference: The obtained t-value is lesser than the 0.05 level of signifiacnce.

this shows the signifiacnce effect between instructional method (CML and SML) and scientific creativity.

Conclusion: The above stated research hypothesis is retained.



Discussion

In studies conducted by **Sunny R. Fernandz and colleagues in 2021**, **Ganita Chaha in 2021**, and **Paravinkousar I. Momin in 2019**, it was observed that there was no significant disparity in academic performance between students in the experimental and control groups prior to receiving treatment in the Synectic's learning model across various subjects such as science, social science, and English. The academic achievements of students categorized as CMLG and SMLG were similar in the pre-test phase. Previous research also indicated that there was no notable difference in the levels of scientific creativity between students in the experimental and control groups during the pre-test stage of the Synectic's learning model in subjects like science and English. **Agilandeshwari and Naga Subramani and colleagues in 2024**, **Sahoo Pravat Kumar in 2022**, and **Rajput Archana in 2018** conducted research in the field. Results from the initial scientific creativity test did not reveal any differences between the groups. However, the outcomes of the post-test in the synectics model demonstrated a significant disparity between the experimental and control groups. Studies in English, Thai, and physics have also been previously conducted. **Sahoo Pravat Kumar 2022**, followed by **Worapong Khuibut in 2023**, and **Sunikumari P. M. in 2013**, along with several others. SMLG's score on the scientific creativity post-test is much higher than CMLG's score.

The synectics academic achievement model demonstrates a notable disparity in the pre- and post-test outcomes of the experimental group. Prior research in the disciplines of physics, science, and social science has been carried out by **Hemaletha Thilakom (2014)**, **Paravinkousar I Momin (2019)**, **Sahoo Pravat Kumar (2022)**, among other. There has been an enhancement in the academic achievement of students in the SMLG before and after the examination. A significant disparity is evident in the pre- and post-test results of the experimental group concerning scientific creativity within the synectics model. Previous studies in the domains of physics and science have been carried out by researchers such as Prasanth, R. (2017), Sahoo Pravat Kumar (2022), and various others. The post-test in the SMLG demonstrated a higher level of scientific creativity compared to the pre-test.

Shinde, Sudhakar Ningappa (2011), M,vani (2013), Chahal Gagnita (2021), and others have previously explored the impact of instructional strategies utilizing the synectics concept on creativity in both experimental and control groups of Hindi and English. Their studies have shown a significant interaction effect between instructional methods and scientific creativity among secondary school students.

Conclusion

The Synectic model is a great way to boost students' creativity in the classroom. By linking different ideas through metaphors and analogies, this approach encourages thinking outside the box and promotes a more profound level of creative involvement. Experimental research has shown substantial enhancements in scientific creativity among Ninth-grade students. On the post-test, the Synectic model learning group shown considerable improvement in both academic attainment and scientific creativity results as compared to their pre-test scores. A stark gap evolved between genders, influencing both academic attainment and scientific creativity. Within the Synectic model learning group, there is a clear positive relationship between scientific creativity and academic attainment. This reveals the significant relationship between teaching approaches (CML and SML) and academic attainment in science. This demonstrates the substantial impact of the instructional method (CML and SML) on scientific creativity. Integrating the Synectic model into education can be incredibly beneficial for nurturing students' creativity and equipping them to tackle the ever-evolving challenges of our world.

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