
EFFECT OF 7E'S MODEL ON CREATIVITY OF STUDENTS IN MATHEMATICS AT SECONDARY LEVEL

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ABSTRACT

The study was conducted to find out the Effect of 7 E's model in developing creativity skill of students in mathematics at secondary level. Pre-test Post test true experimental group design was applied. All the students of secondary level in Punjab were the population of the study. Government High School Kallar Syedan was chosen as sample through purposive sampling technique. Students of 9th class were divided into two equal groups (30 students in each group) randomly. Control group was taught conventionally while experimental group was taught through 7 E's Model. After treatment of eight weeks post-test was held and scores of control and experimental groups students were compared through independent sample t-test. It was observed that creativity level of experimental group students was significantly high as compared to control group students' level of creativity. It was recommended that 7 E's model of teaching may be applied for teaching mathematics at secondary level.

KEYWORDS

Knowledge, 7E's Model, Conventional Method, Pre-test, Post-test, Creativity

INTRODUCTION

Education is responsible to produce enlightening society which proves beneficial for its learners. It addresses the issues like creativity which removes the learners' complications in mathematics education and supports them to create and produce new ideas and notions. Mathematics understanding is necessary and compulsory component for every student in any discipline of his/her life. Mathematics syllabi remains important part of changing period of technology which up brings the abilities of students (Ngussa and Mbuti, 2017), Mathematics is called creative language and has unique importance in the life of a person and education of mathematics remains zippy portion of curricula from Nursery to secondary level in global era (Noreen & Rana, 2019).

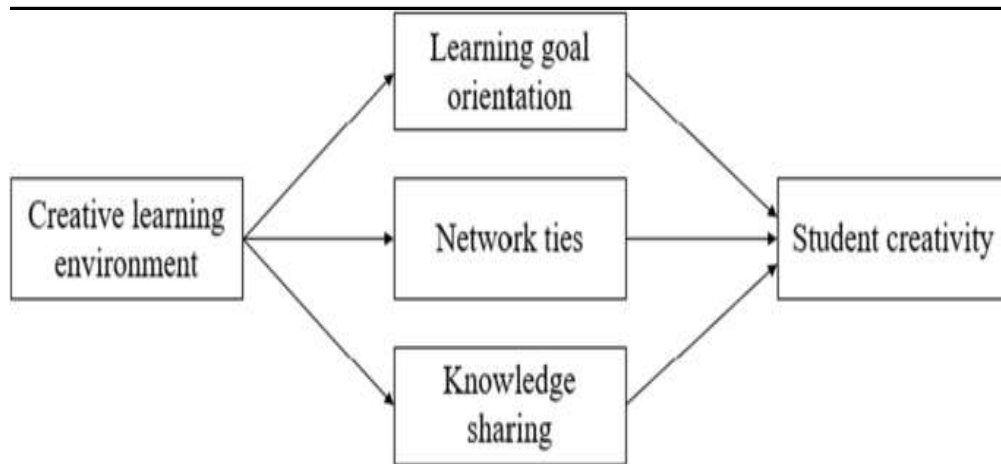
Factually mathematics has unique and vital among subjects. Mathematics is conceived from nature (Babar, 2011) and Pound (2011) claim that mathematics has strength to unfold mystery of living world. Carey et al. (2017) described that skills to interpret mathematics are imperative part for upholding the level of academic achievement as well as strengthening them to tackle day to day complications.

Mathematics knowledge facilitates students to provide entrance to logics, thinking and reasoning and stand them to deduce education or communicate ideas through different ways like: oral practices, in written shape, outlines, graphical perspective and visuals (Rizqi and Surya, 2017). Lipnevich et al. (2011) elaborate that proficiency of mathematics has specific significance as it is compulsory part of economics activities. Versatile aspect of mathematics has privileged in the subject of, technology, commerce and science (Abe and Gbenro, 2014). Mathematics has strength of various efforts to improve the situation and keeps outstanding power to adjust as per ongoing scenario (Amirali, 2010).

Creativity is virtue to move forward and improving creativity skill is a big challenge for teachers. Creativity is defined as to depict new notions, those are not present earlier. Creativity supports the ability to conceive current dynamic notions and creative strategies to tackle the academic complications which happens through consideration and conversations among participants (Rodríguez et al, 2017) and creativity is generally named as learner's ability to present new ideas (Liu, (2017).

Fan and Cai (2020) discussed hypothesized model of creativity which is shown in Fig. 1.

Fig. 1: The hypothesized model



Creativity is the learnt level that supports students for arranging the symbolic impressions and to present solution of reservations and expectations to declare their current level of understanding and rate the notions of participants (Kampylis & Berki, 2014). Four types of creativity is defined as under (Helfand et al, 2017):

- i. Big-C creativity:
Big-C works for moving towards upper level. It is specified to describe the struggle of aristocracy.
- ii. Pro-C creativity:
Pro-C creativity functions having enough time.
- iii. Little-C creativity:
School level learner exercise little-c creativity.
- iv. Mini-C creativity:
This kind of creativity functions in imagery mode. It moves with notions and imaginations of learners.

Lucas (2016) discussed Centre for Real-World Learning's five dimensional model of creative habits of mind. Textual and diagrammatic aspect of five dimensional model is given below:

1. Inquisitive

Curious mind can raise the relevant questions.

Marveling and Interrogation: Curious students raise questions for producing new notions.

Seeking and Curious: Seeking the information following questioning helping to grasp new idea.

Ambitious Presumptions: May be ready for challenges.

2. Imaginative

Imagination and possibilities are fruitful for a creative personnel.

Having State of Capabilities: Building an idea first and then to chalk out it.

Linkages: Different ideas are linked together for building new concepts.

Insight: When learners go insight the idea then may be easy to build better new concept.

3. Persistent

Determined learner never give up their efforts.

Stay with Challenge: Firm stance leads towards new notion.

Bold for Different: Clear stance and level of confidence prove fruitful for new concept.

If ambiguity persists then do not get hyper till the situation clears for new concept.

4. Collaborative

Collaboration mode helps to solve easy and difficult task and finally touch the new idea.

Exchanging Mode: Ideas may be exchanged and have fruitful situation for better new idea.

Feedback Importance: This situation helps to improve the idea.

Proper Cooperation: Cooperation is present whenever is needed and situation makes complex ideas to simple ones.

5. Disciplined

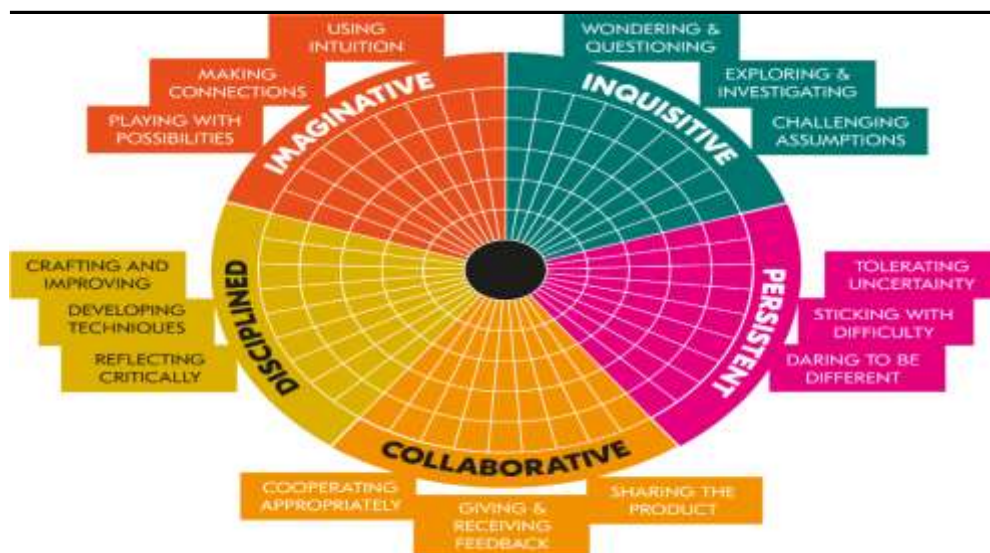
There is a strong need to be disciplined when creativity process is going on and in completion phase.

Arranging Methodology: Try to improve the idea despite it is completed earlier.

Need of Reflection: After an idea is produced then there is a need to evaluate it critically.

Improvement: Admitting the performance of every participant and then prepare it with detail.

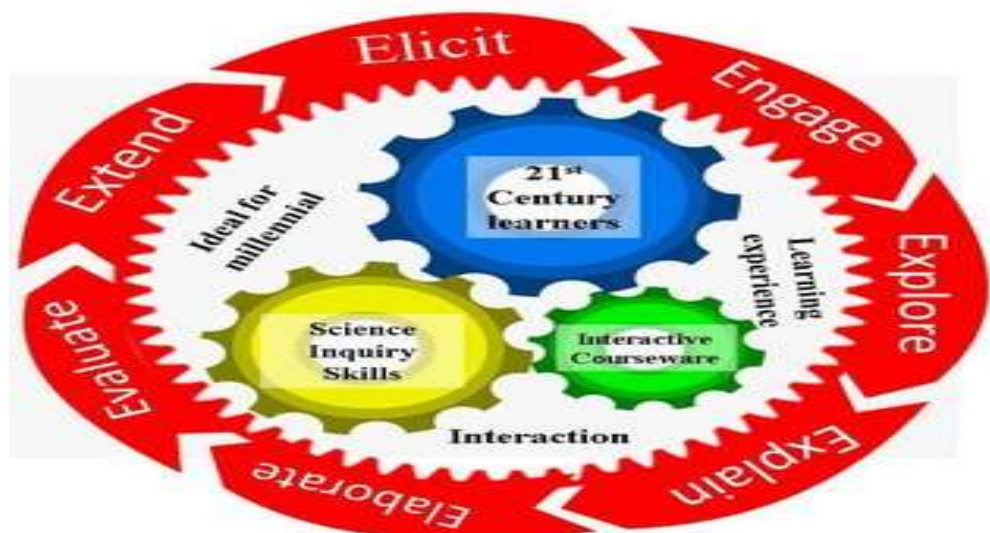
Fig. 2: CRL's five dimensional model of creative habits of mind



7E's Model

Elicit, Engage, Explore, Explain, Elaborate, Evaluate and Extend are the phases of 7E's model (Eisenkraft, 2003).

Fig. 2: 7E's Model



Source: Lubiano, M. L. D., & Magpantay, M. S. (2021). Enhanced 7E Instructional Model

towards enriching science inquiry skills. *International Journal of Research in Education and Science (IJRES)*, 7(3), 630-658.

Phases of 7E's Model

1. Elicit

Elicit phase facilitates teacher and learner to associate previous learning with present learning level. As that present learning is occurred on behalf of previous learning. Elicit phase helps learners to identify the baseline education (Santi and Atun , 2011) and Suardana et al. (2018) describe that basic education of the pupils may be dogged with community interaction which may support to transfer the suitable knowledge, that is meant that earlier learning proves advantageous to increase the learners level of learning and in elicit phase teacher gains concentration of learners on earlier learning which helps to achieve desired objectives (Adesoji and Idika, 2015).

2. Engage

Opportunity of exchange of ideas is given for improvement of understanding when learners are engaged with content. Persuasive and artistic power drives learners for their involvement in educational practices (Aydin and Coskun, 2011). Zuhdiyan et al. (2020) are of the views that specific feelings of learners can be utilized by the teacher for the achievements of appropriate objectives and the phase of engagement may be made beneficial to utilize learners' feelings.

3. Explore

Teacher instructs learners to classify competition, detaching variables, sketch out the statistics, draw diagrams, display outcomes and arrange final statements and then teacher evaluate the learner's level of learning. 7E's model "Explore" phase improves learners' level of inspiration and boosts them to take up the lesson with series of experiments (Yaman and Karasah, 2018). Celik et al. (2013) opine that practices of experiments enable students to hold learning in the form of current situation and observations, improves motivational level and inculcate conclusive approach for better understanding level.

4. Explain

Information about the topic is given here after judging level of learning of learners'. Experiences and observations of learners are given opportunities to explain whichever they have learnt at the moment. The phase of explanation of 7E's model encourages the learners for the enhancements of their level of confidence involving them in the sessions of questions and answers (Purnamasari et al., 2017) and when level of motivation of learners is increased the level of confidence increases (Khaeruman and Saleh, 2016).

5. Elaborate

Now learners are given chance to discuss and give their views in current position and they may be encouraged to pose their questions and make present their motives for more exploration. This phase specifically supports learners to present solution of the complications. This phase is called transfer of knowledge phase by Eisenkraft. Phase of elaboration gives chance to learners to explain their accomplished assignments (Riconscente, 2014). Cetin-Dindar and Geban (2017) explain that 7E's model encourages teaching approach for conceptual understanding and helps learners' to remove misconceptions based on learning theory of constructivist. This phase of 7E's model enhances learners' understanding level and boosts abilities like: reasoning and logics by raising academic achievement level of learners to enable them to understand and tackle difficult issues (Adesoji and Idika, 2015).

6. Evaluate

As per condition evaluation process is completed to understand the learners' level of learning. This phase facilitates learners to raise the level of confidence that they have completed the assignment (Lay and Cahndrasegaran, 2016) and Suardana et al. (2018) describe that this phase gives opportunity to maintain learners' concepts, rules and recommend application of knowledge.

7. Extend

This phase encourages learners to share their learning level with companions and teachers. Teacher guides the learners are advised to share concepts and ideas freely. 7E's model has strength to impart education in a short period of time. (Balta and Sarac, 2016). And Qarareh (2012) claims that 7E's model boosts learners inspirational level which guides towards enhancement of academic performance level.

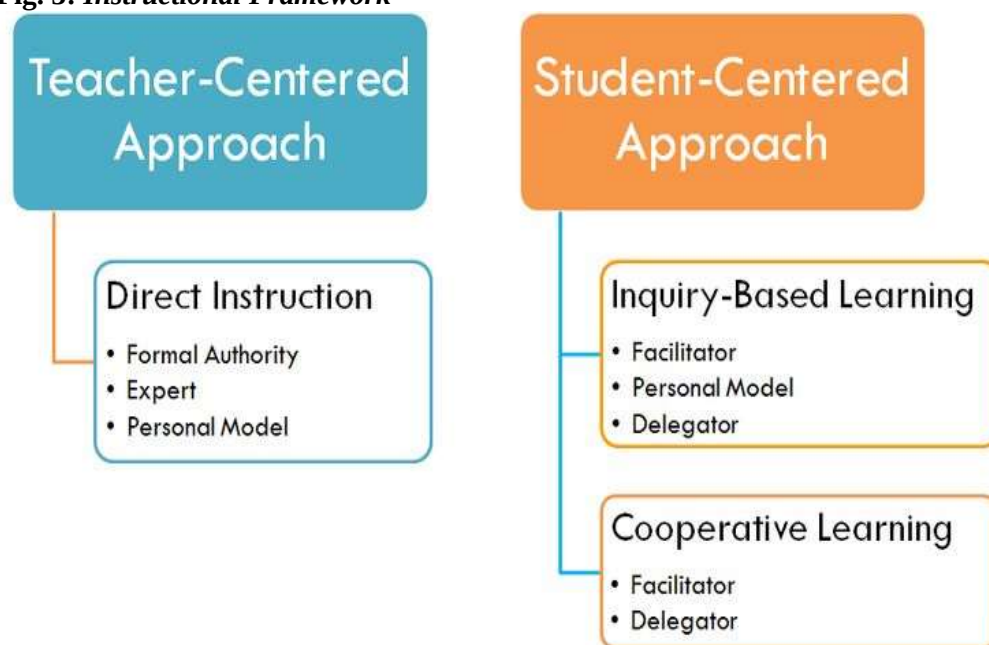
Traditional Teaching Methods

The teaching methods those assumed teacher-centered focused on the theory of behaviorism and work as a catalyst for achieving appropriate results in the shape of students' achievements (Abell et al, 2010). It means that these methods make students inactive whereas active participation of the students make their learning better. Lecture method of Traditional method of teaching is a method named teacher centered teaching method and lecture method which is a part of traditional method of teaching is used to educate students (Hightover, 2011). Various research papers have enough evidences that traditional methods are commonly used in classroom practices and these methods are mostly adopted by the teachers using lecture method (Berrett, 2012).

Harmon (2017) explains that elementary school teachers of elementary grade imparts

education to students applying lecture method without applying active learning modes to clarify the students' concepts and teachers are responsible for the implementation of the syllabus (Orlich et al, 2012). Traditional methods of teaching functions in passive mode not have capacity to involve students in ongoing topic then the net result produces low academic achievement level. When teaching process is completed using lecture method passive involvement of learners is seen contrary to the conceptual teaching where learners' participation is fully concentrated and in active phase (Ullah and Iqbal, 2020). Teaching using traditional teaching method learners are given information by the teacher in a passive mode. Different conventional instructional framework have been discussed below (Saskatchewan Education, 1991):

Fig. 3: Instructional Framework



RESEARCH OBJECTIVES

1. To examine the effect of 7E's model on creativity of students.
2. To compare 7E's model effect on creativity of students of experimental and control groups.

RESEARCH HYPOTHESES

1. There is no significant effect of 7E's model on the creative abilities of students.

2. There is no significant difference between achievement of control and experimental groups' students regarding creativity.

RESEARCH METHODOLOGY

Strategies and methodologies used to complete the study were given as follows.

Population of the Study

Students of class 10th enrolled in mathematics (Science) group of fifty-one schools of Tehsil Kallar Syedan administered by the government of the Punjab were treated accessible population for this specified study. This population was named universal population as that the alike syllabi is taught throughout Punjab.

Sample of the Study

Students got registration in mathematics (Science) group of Government High School Bhakral, Tehsil Kallar Syedan, District Rawalpindi, Punjab were chosen purposively for this specific study. The results endorsed by Board of Intermediate and Secondary Education (BISE) for 9th class were taken for equating both the groups. Experimental and control groups were selected through randomization process and each group had a number of thirty students.

Research Design

The research was aimed to find the effect of 7E's model. The design of the true experimental study was Pretest-Posttest control group. Askari and Noah (2013) proposes following Pretest-Posttest control group design as shown in Fig. 4.

Fig. 4: Pretest-Posttest Control Group Design

Group	Pre-test	Treatment	8th week Post-test
RE	O1	X	O2
RC	O3	-	O4

Note: RE = Experimental group X= Treatment
 RC = Control group O = Observation
 R = Randomization

Source: Askari, M. and Noah, S. M. (2013)

Data Collection Instruments

Collection instrument was Pre-test. After re-arranging the order of test items of the

Pre-test was prepared as Post-test. Thirty-five items were included in Pre-test. Total marks of Pre-test were hundred.

Data Analysis

After collecting data mean, standard deviation and difference of means were tabulated. At .05 significant level significant difference was obtained for the mean scores of both the groups applying t-test.

FINDINGS

Pre-test Score

Table 1: Mean Scores of Experimental and Control Groups on Pre-test

Group	N	Mean	SD	t-value	p-value
Control	30	18.10	8.216	.84	.2021
Experimental	30	19.83	7.764		

The table indicates that t value $.84 < 1.92$ and $p \ 0.2021 > 0.05$ showed that there is no significant difference between control and experimental group in pretest score. It means both the group are equal at this stage.

Post-test to test the Null Hypotheses

There is no significant effect of 7E's model on the creative abilities of students. T-test was used to test the first null hypothesis. Summary of the perceived results is shown in Table 2.

Table 2: Difference between the Mean Scores of Experimental and Control Groups regarding Creativity on Post-test

Group	N	Mean	SD	t-value	p-value
Control	30	27.90	9.35	5.648	.000
Experimental	30	47.33	16.34		

Table 2 is convenient to portray that independent sample t-test outcomes indicate significant mean scores difference between control and experimental groups' students. It means that 7E's model has positive effect on experimental group students and their creating skill was enhanced contrary to the control group students.

DISCUSSION

Education helps and becomes a permanent source to enlighten the society omitting darkness and ignorance. Quality of education can be improved through dynamic and vibrant teaching methods. The main purpose of present study was to find out the effect

of 7E's model contrary to the traditional teaching methods. The tested hypotheses depicted that there was significant difference between the mean scores of control and experimental groups' students as 7E's model showed positive effect and raised the bar of the learning level of the students of intervening group. The outcomes of the study guided that 7E's model supported students of experimental group to learn better and raised their skill of creativity. GoK (2014) findings supports the present study findings so that 7E's model helps students to improve their level of learning. 7E's model promotes activity based teaching that offers students chance for active involvement in the topic which helps them to raise their level of learning. In conclusion phase of this specific study the researcher found 7E's model enhanced learning level of students. Findings of Githae et al. (2015) supported the present study findings as that 7E's model proved meaningful better for the enhancement of learning level of the experimental group students against traditional teaching method.

The scores of the independent sample t-test of present study portrayed significant mean difference in post-test scores on skill of creativity of the experimental group and control group which is evidence that the skill of creativity of students of treatment group revised towards high rank as compared to control group students. It means that 7E's model supported treatment group students to enhance learning level. Finally it is said evidently that 7E's model raised creativity skill of treatment group students as compared to control group students.

CONCLUSIONS

The utmost desire of educationists is to explore a vibrant and dynamic pedagogical alternatives for the enhancements of students' performance and skill of creativity. Outcomes attained by the control and experimental groups students imparting education using 7E's model and traditional teaching method in mathematics conclusion was that creativity skill of experimental group students was significantly high as compared to control group students. It seemed clear that 7E's model proved as an effective instructional model which leads towards conceptual teaching learning process using Elicit, Engage, Explore, Explain, Elaborate, Evaluate and Extend phases of 7E's model.

RECOMMENDATIONS

Secondary school teachers' mathematics may be moved for pro-active teaching methods which are innovative like 7E's model. Teachers may be given training for understanding and implementation of 7E's model for routine teachings.

Lesson plans and teachers' guides may be prepared as per 7E's model for routine teachings. Institutions head may be given training for supporting teachers for using

7E's model in routine teaching.

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