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Research Article

Effectiveness of 5-Es Model of Teaching on the Process of Learning Geography at Elementary School Stage: An Experimental Study

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ABSTRACT

The investigators carried out an experimental study for finding out the effectiveness of 5-Es model of instruction. The 7th grade students were selected and divided into two groups such as Experimental Group and Control Group. Both the groups were matched one to one student to establish the equivalency of both the groups of this study. The experiment was conducted under controlled conditions. The experimental group was provided instruction through 5-Es model based on the theory of constructivism. On the other hand, the control group was taught through conventional method of teaching. The course content of seven units of Geography was delivered in both the groups of this experiment. It is worth mentioning that the investigators adopted Pre-Test and Post-Test experimental design. Finally, the experimental group showed better perceptions and performance in the learning of geographic content than the students of control group. From this, it is concluded that the 5Es model of teaching may be adapted by the teachers at elementary school stage across the state of Assam.

Key words: Effectiveness, Performance, Experimental Group, Control Group, Pre-test scores, post-test scores, Perception

1. Introduction:

"By education I mean an all-round drawing out of the best in the child and man - body, mind and spirit."- Mahatma Gandhi. Science and Technology is playing a crucial role in every walk of life now a days. Moreover, the world is changing very fast and it has entered into the 21st century. The present century Information and Communication Technology (ICT). Because of the development and use of ICT, the new society is emerging. This is the society which makes use of digitization for every purpose. The process of education has been greatly influenced by the applications of ICT.Educational process has been revolutionized in the Western World by way of adopting new approaches of teaching and learning. These modern approaches of teaching emphasize on the various principle of instructional technology.

There are many different learning theories that can be used to help and guide a teacher in the process of teaching and learning. Constructivism is one of the theories that explains how learners might acquire knowledge. Jean Piaget and Lev Vygotsky are two eminent figures in the development of constructivist theories. The theory suggests that people construct their own understanding and knowledge of the environment by testing ideas and approaches based on their prior knowledge and experience.

When choosing an instructional model, teachers seek strategies that help students gain a complete considerate of new concepts. They aim to engage students, motivate them to learn, and guide them toward skill development. One of the ways to do that is by including inquiry-based approaches like the 5Es Model, which is stranded in active learning. The 5Es Model is based on the constructivist theory to learning, which suggests that people construct knowledge and meaning from experiences. By understanding and reflecting on activities, students are able to reunite new knowledge with previous ideas. In the classroom, constructivism requires educators to build inquiry, exploration, and assessment into their instructional approach. In many ways, this means the teacher plays the role of an implementor, guiding students as they learn new thoughts.

The 5Es Model is most effective when students are encountering new notions for the very first time because there is opportunity for a complete learning cycle. The 5E Model of Instruction includes five phases: Engage, Explore, Explain, Elaborate, and Evaluate. It delivers a carefully planned arrangement of instruction that places students at the centre of learning. (Duran & Duran,2004)

- **Engage:** It is the stage in which the attentions of learners are attracted and meanings of various concepts are learned. In this stage students are asked questions by the teacher and a discussion environment is created. An interesting story can be told or a video is watched and students' attentions are caught. If the students' attention is taken and questions need to be answered appear in their mind, this stage serves its purpose.
- **Explore:** It is the stage in which the questions unanswered in engage stage are clarified. In this stage, activities of students are intense. In explore stage, students explore new information by making research, creating a discussion environment among them or by way of experiment. Teachers, however, help students reach the materials they need in this stage.
- **Explain:** In explain stage, students based on the information they obtain create new concepts. Students explain the concepts with their own sentences. In this stage, video watching and direct instruction can be used.
- **Elaborate:** The concepts formed by students, the classification made are applied to various conditions and events. This stage is based on experimental study, questioning, examination projects and problem solving. Students finding an application area in this stage can contribute to permanent learning. In this stage, method and techniques such as question and answer, discussion and similarity can be used.
- **Evaluate:** It is the stage in which the concepts that students have learned and have not learned during the process, the application levels of the information they learn are determined and the students evaluate their learning condition. In this stage, open-ended questions can be directed to students, written examination or performance evaluation can be done. Evaluation process enables the students to realize their deficiencies and obtain information about learning process.

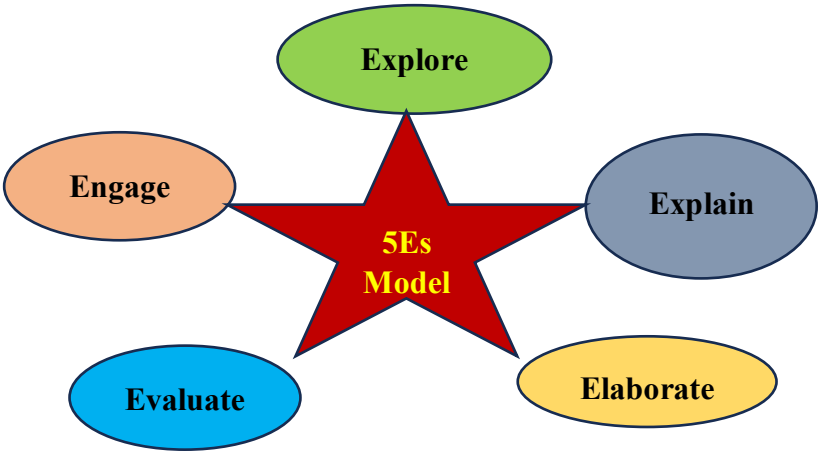


Figure 1: The 5Es Instructional Model

The 5Es model has been tried by several scholars in Abroad and India like Prajapati (2020); Barik (2022); and in international context by Tegegne and Kelkay (2023); Rout (2024); Duran and Duran (2004); Oteles (2020); Bahadir and Dikmen (2022); Ahmed, Shaheen and Gohar (2018) and in north east context by Sonowal and Ranjan (2024).

2. Rationale of the study:

For teachers and learners similar, creative teaching methods can yield several advantages. Advanced teaching techniques can aid in constructing a more productive learning environment for students by fostering an atmosphere that is inspiring and supportive of active learning. Sometimes, the Indian educational system prevents pupils from following their interests, which destroys their creativity and cognitive abilities. Students are being compulsory to choose careers in fields they are not attracted towards further due to the system's rigidity and lack of options, which is resulting in average performance. By addressing the errors in the current educational system, the National Education Policy 2020 plays a major role in placing the groundwork for educational changes. The majority of teachers at the schools solely employ the conventional technique; they do not use creative teaching methods. Advanced teaching methods should be applied to the entire educational system. Before they begin teaching, teachers should learn about a teaching content, which can increase student achievement to previously unheard-of levels and increase teaching effectiveness more quickly than any conventional method of teaching. (Sonowal, R,2024) Learners can develop their own knowledge through a sort of teaching method called constructivism, which is based on the 5Es learning cycle.5Es Model is most effective when students are encountering new notions for the very first time because there is opportunity for a complete learning cycle.

There are several studies which have shown the effectiveness of 5Es Model in importing the instructions and ensuring learning at mastery level among the students. Some of the important studies are- Prajapati (2020); Barik (2022); and in international context by Tegegne and Kelkay (2023); Rout (2024); Duran and Duran (2004); Oteles (2020); Bahadir and Dikmen (2022); Ahmed, Shaheen and Gohar (2018) and in north east context by Sonowal and Ranjan (2024). All these studies have shown the positive effect of 5Es Model in the process of learning.

3. Statement of the Research Problem:

The research problem is hereby stated as: "Effectiveness of 5-Es Model of Teaching on the Process of Learning Geography at Elementary School Stage: An Experimental Study".

4. Objectives of the Study:

The objectives of the study divided into two groups and those have been stated as under:
(Group A) **Primary Objectives:**
i) To investigate the effectiveness of 5Es model on the academic performance of 7th grade learners on summative criterion test covering geographic content as compared to CMT. ii) To find out the perceptions of 7th grade students towards 5-Es model of importing instruction in the classroom situation while delivering the geographic course content.
Group -B: **Secondary Objectives:** After designing and developing the materials and testing tools as the primary objectives, the investigators carried out the true experiment for achieving the following specific objectives:
i) To develop the instructional lesson plans based on the principles of 5Es model by taking the course content of geography for 7th grade learners. ii) To develop the formative tests pertaining to units of geographic content. iii) To develop the summative criterion test for obtaining the performance scores of experimental and control groups. iv) To develop an attitude scale for measuring the general perception of 7th grade students towards 5Es model of imparting instruction.

5. Hypotheses of the Study:

i) There is no significant difference between the academic performance mean scores of two groups of 7th grade learners: One following 5Es model and another following CMT for learning of the geographic course content.
ii) There is no significant difference between the perception mean scores of male and female 7th grade learners towards 5Es model of imparting instruction pertaining to geographic course content.

6. Significance of the Study:

First, the outcome of the present is significant to ensure satisfactory level of learning on the part of the learners. Second, it may be NPE-1986, POA-1992, and NEP-2020 or NCFSE -2005 here in India all have recommended some major shifts in Indian educational process like shifting from teacher/teaching-oriented classroom, shifting from non-mastery learning to mastery learning etc. All such type of changes in the process of education are only by adopting new and modern approaches of teaching as the 5Es model of teaching has been tried out and showed better performance of the students in geographic learning. So, the study provides some insight to work towards the implementation of ideas of having some shifts in the Indian system of education and ensuring the quality of education. The study seems to be extremely significant as an eye opener for the young researchers who are putting their minds and field instructional technology which is demand of hour in 21st century to meet up the requirements of Liberalization, Privatization and Globalization (LPG) at world scale.

7. Delimitations of the study: The present study has been delimited to:
i) 5Es model of teaching, and CMT ii) 7th grade
learners
iii) Seven unites of the 7th grade Geography Course content prescribed by State Education Board of Assam (SEBA)

8. Methodology: In accordance with the nature of the objectives and hypotheses of this study, the investigators thought appropriately for making use of experimental method of educational research. The experimental method was adopted by following the true Pretest – Post-test experimental design by considering the 7th grade learners as the population of this study out of the total 75 numbers of 7th grade learners, the investigator selected 50 number of learners as the sample of this study. Further the selected sample of 50 7th grade learners was divided into two equal groups and designated as the experimental group and control group. It is significant to state that both the groups (Experimental Group and Control Group) were equated by matching the learners of both the groups on one-to-one basis. After this, the experiment was carried out and continued till the time of the completion of geographic course content.
9. Tools Used: For the completion of the experiment, the experiments used the following tools:
i) Lesson Plans developed by following the structure of 5-Es model of teaching of geographic course.
ii) Formative Tests: Developed by the investigators for each lesson plan.

iii)Summative Criterion Test: Developed by the investigators to obtain the Pretest and Post test scores of the learners of experimental and control groups. iv)Attitude Scale to measure the perceptions of learners towards 5Es model of imparting instruction.

10. Experimentation: The experiment was completed in three phases and these are described as under:

Phase -I: This is the first phase of an experiment under which the selected sample of 7th grade learners was divide into two equivalent groups designated as the Experimental Group and Control Group. Before applying the treatment, the summative criterion test was administered on all the 7th grade learners of the experimental and control groups. The scoring work was completed and pretest scores of both the groups were recorded properly.

Phase II: After obtaining the Pre test scores, the experimental group was taught through the 5Es model by adopting the well-prepared lesson plans with 5Es, i.e., i) Engaging ii) Exploring iii) Explaining iv) Elaborate and v) Evaluation. Each unit of the course content of Geography was delivered with the help of 5Es model lesson plan and at the end of delivering the lesson plan, immediately formative test was administered to ensure the 90/90 criterion which means that 90% learners of the experimental group obtained 90% score on the formative test. The left-out learners were provided relevant feedback and reinforcement. Same procedure was followed for covering all the selected units of the course. On the other hand, the learners of control group were taught through conventional method of teaching same course content and no any other special treatment was provided to them and the experiment was completed successfully. At the end of the experiment, the Summative Criterion test was administered on the learners of experimental and control group. The scoring work was completed and Post-Test scores of all the learners of both the groups obtained and recorded properly.

Phase III: Now in this phase, the 7th grade learners of experimental group were called and an attitude scale was administered on them just to measure their attitude/perception towards 5Es model through which they learnt the course content of Geography. Not only this, but some interaction and discussion also followed. The students projected their feelings by way of appreciating the new strategy of teaching. The feelings and perceptions of students were recorded for further analysis and interpretation.

Table 1: Pre-test scores of 5E and CMT groups on Summative Criterion Test

Sl/No of Students	G-A 5Es Model Group (5E): ExG	G-B Conventional Method of Teaching (CMT) Group:CG
1	36	30
2	40	30
3	23	27
4	34	47
5	24	37
6	27	38
7	58	40
8	54	32
9	25	34
10	31	36
11	27	40
12	52	34
13	20	30
14	23	40
15	38	40
16	23	40
17	40	34
18	65	40
19	22	36
20	37	40
21	31	27
22	53	34

23	36	33
24	30	40
25	28	30
N=25	$\sum X_2$**=827**	$\sum X_3$**=843**

Table 2: Immediate Post-test scores of 5E and CMT groups on Summative Criterion Test

Sl/No of Students	**G-A 5Es Model Group (5E): ExG**	**G-B Conventional Method of Teaching (CMT) Group:CG**
1	80	31
2	88	35
3	80	30
4	83.5	47
5	89	37
6	85	38
7	99	40
8	80	32
9	89.5	34
10	80.5	40
11	81.5	34
12	83.5	35
13	89	30
14	80	40
15	92.5	40
16	82.5	34
17	84.5	40
18	89	40
19	82	36
20	86.5	30
21	80.5	34
22	86	35
23	89	35
24	88	40
25	101	30
	$\sum Y_2$**=2150**	$\sum Y_3$**=897**

11. Analysis and Interpretation of Results:

For the purpose of analysis of the obtained Pre-Test and Post-Test scores of Experimental and Control groups of the learners, Analysis of Covariance adopted as the statistical technique. The complete analysis of data was done and the computed results in accordance with the formulated objectives and hypotheses are stated as under:

Objective 1: To investigate the effectiveness of 5Es model on the academic performance of 7th grade learners on summative criterion test covering geographic content as compared to CMT.

Hypothesis 1: There is no significant difference between the academic performance mean scores of two groups of 7th grade learners: One following 5Es model and another following CMT for learning of the geographic course content.

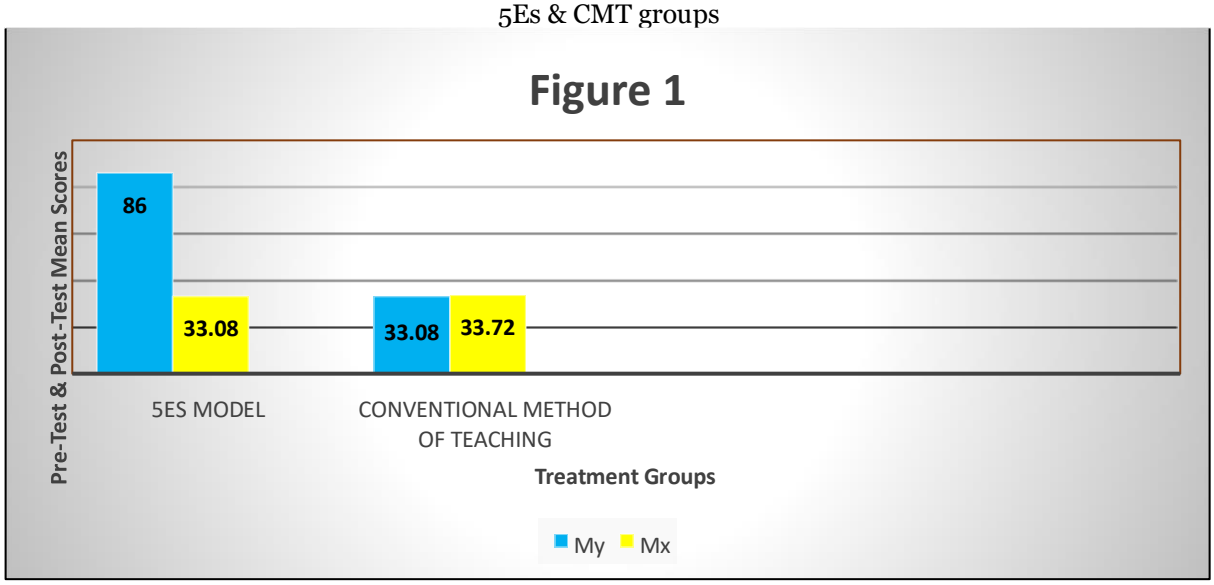
Table-3: Summary of computed Immediate Academic Performance of 7th Grade Learners of 5Es and CMT

Components of Variability	**Sum of Squares (SS)**	**df**	**Variance (V)**	F
Between samples or treatments, D	29,813.68	1 (C -1)	30,761.37	1388.14
Within samples of errors,E_w	947.69	47 (N-C-1)	22.16	
Total,E_t	30,761.37	48 (N-2)		

Table 4: Adjusted Mean of Summative Criterion Test Scores of Frist Group (5E) and Second Group (CMT)

Group	**No. of students in the Group**	M_y	M_x	**Adjusted Mean** M_{YX}
5Es Model of Teaching	25	86	33.08	86.14
Conventional Method of Teaching (CMT)	25	35.8	33.72	35.66
			GM_x=33.4	

Figure 1: Effect of the treatments on pre-test and post-test immediate performance criterion scores of the 5Es & CMT groups



Interpretation:

The table 3 shows that the calculated F-value came out to be 1388.14 which is greater than the criterion F - value (7.23) at 0.01 level of significance for 1/47 df.As the calculated F-value (1388.14) is greater than the criterion F-value (7.23) at 0.01 level of significance for 1/47 df,therefore,the formulated hypothesis: "There is no significant difference between the academic performance mean scores of two groups of 7th grade learners: One following 5Es model and another following CMT for learning of the geographic course content." got rejected. It means that there is a significant difference in the immediate academic performance of students of 5Es and CMT groups on the summative criterion test.Now, it is significant to note, as revealed in table 4 that the mean score of 5Es group came out to be 86.14 (78.30%) and the mean score CMT group came out to be 35.66 (32.41%) on the summative criterion test for their immediate performance which shows that the 5Es model of teaching has been effective to bring out the class 7th students of Rajgarh Academic Centre at suitable desired level of learning.

Objective 2: To find out the perceptions of 7th grade students towards 5-Es model of importing instruction in the classroom situation while delivering the geographic course content.

Hypothesis 2: There is no significant difference between the perception mean scores of male and female 7th grade learners towards 5Es model of imparting instruction pertaining to geographic course content.

Table 5: Frequency table showing the Attitude scores of 7th class male learners through 5Es model of teaching.

CI	f	x	fx	fx^2
56 - 57	4	3	12	36
54 - 55	7	2	14	28
52 - 53	4	1	4 (+30)	4
50 - 51	13	0	0	0
48 - 49	3	-1	-3 (-5)	3
46 - 47	1	-2	-2	4
	N = 32		$\sum fx$=25	$\sum fx^2$=75

$$\mathbf{SD} = \mathbf{i}\sqrt{\frac{\sum fx^2}{N} - (\frac{\sum fx}{N})^2}$$

$$=2\sqrt{\frac{75}{32} - (\frac{25}{32})^2}$$

$$=2\sqrt{2.34 - (0.78)^2}$$

$$=2.638$$

$$\mathbf{Mean} = \mathbf{AM} + (\frac{\sum fx}{N}) \times i$$

$$=50.5 + (\frac{25}{32}) \times 2$$

$$=50.5 + (0.78) \times 2$$

$$=52.06$$

Table 6: Frequency table showing the Attitude scores of 7th class female learners through 5Es model of teaching.

CI	f	x	fx	fx^2
56 - 57	3	3	9	27
54 - 55	2	2	4	8
52 - 53	6	1	6	6
50 - 51	7	0	0	0
48 - 49	0	-1	0	0
46 - 47	0	-2	0	0
	N = 18		$\sum fx$=19	$\sum fx^2$=41

$$\mathbf{SD} = \mathbf{i}\sqrt{\frac{\sum fx^2}{N} - (\frac{\sum fx}{N})^2}$$

$$=2\sqrt{\frac{41}{18} - (\frac{19}{18})^2}$$

$$=2\sqrt{2.28 - (1.06)^2}$$

$$=2.154$$

$$\mathbf{Mean} = \mathbf{AM} + (\frac{\sum fx}{N}) \times i$$

$$=50.5 + (\frac{19}{18}) \times 2$$

$$=50.5 + (1.06) \times 2$$

$$=52.62$$

$$\mathbf{D} = |M_1 - M_2|$$

$$= |52.06 - 52.62|$$

$$= 0.56$$

$$\mathbf{t} = \frac{D}{SE_D}$$

$$=\frac{0.56}{0.69} = 0.8116$$

$$SE_D = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

$$= \sqrt{\frac{(2.638)^2}{32} + \frac{(2.154)^2}{18}}$$

$$=\sqrt{\frac{6.96}{32} + \frac{4.64}{18}}$$

$$= \sqrt{0.218 + 0.26}$$

$$=\sqrt{0.478}$$

$$=0.69$$

Table 7: Showing the summary of the results of t Test scores of 7th class male-female learners through 5Es model of teaching.

Gender	N	Mean	SD	D	SE_D	t
Male	32	52.06	2.638	0.56	0.69	0.8116
Female	18	52.62	2.154			

Interpretation:

The table 7 reveals that the computed t-value came out to be 0.8116 which is lesser than the table t-value at .05 level of significance for 48 df, hence, the formulated hypothesis: "There is no significant difference between the perception mean scores of male and female 7th grade learners towards 5Es model of imparting instruction pertaining to geographic course content." got retained. It means that the male and female 7th grade students do not differ in their perception towards the 5Es model of teaching. Further it may be understood that the 7th grade students liked the 5Es model in the process of their learning highly and equally.

Conclusion:

Taking the stock of computed results and their interpretations, finally it is concluded that the 5Es model of teaching has been found quite effective in the teaching and learning of 7th grade learners in the process of imparting the geographic content as compared to the traditional method of teaching. Therefore, 5Es model of teaching may be used for teaching and learning of any other subject at elementary school stage across the state. Further it has also been observed that the 7th grade liked this (5Es model) new approach of teaching and the learners showed their satisfaction on the use of it.

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