EFFECTIVENESS OF 5-E LEARNING INSTRUCTIONAL MODEL ON ACADEMIC ACHIEVEMENT OF SCIENCE STUDENTS

Anita M. Belapurkar, Ph. D.
H.G.M. Azam College of Education, Pune

Abstract

The field of science education includes work in science content, science process, and teaching pedagogy. Several studies show that, practical science knowledge and school science knowledge are becoming mutually exclusive. An alternative is to change the focus of the classroom from teacher-centred to student-cantered using a constructivist approach. 5-E model is one of the most important model based on constructivism and researcher felt the need of testing the effectiveness of the same in science teaching. The present research is thus an experimental research testing effectiveness of 5-E instructional model for teaching science to 8th standard students. It includes a basic survey of the teaching learning methods used by science teachers, developing a program of teaching learning based on 5 E, and testing its effectiveness. Survey regarding teachers opinions highlights the fact that though teachers feel that science is a subject that can be better understood by active engagement of the students, it is not happening actually in the classroom where due to many reasons today. 5-E Instructional Learning Model used for 8th standard students for science teaching was found to be very effective as far as the academic achievement of students is considered.

Introduction:

The field of science education includes work in science content, science process, and teaching pedagogy. Several studies show that, practical science knowledge and school science knowledge are becoming mutually exclusive. Many students see little connection between what they learn in science classroom with the real life.

An alternative is to change the focus of the classroom from teacher-centred to student-cantered using a constructivist approach. Learners actively take knowledge, connect it to previously assimilated knowledge and make it theirs by constructing their own interpretation (Cheek, 1992).

Teacher expertise instructional models thus are only effective for classroom learning; therefore various instructional models are being used at school level.
5-E Instructional Model:
5-E Instructional Learning Model was designed by science teachers for secondary science teaching. It has a classical constructivist structure.

The 5 E's is an instructional model based on the constructivist approach to learning, which says that learners build or construct new ideas on top of their old ideas. The 5 E's can be used with students of all ages, including adults.

Each of the 5 E's describes a phase of learning, and each phase begins with the letter "E": Engage, Explore, Explain, Elaborate, and Evaluate. The 5 E's allows students and teachers to experience common activities, to use and build on prior knowledge and experience, to construct meaning, and to continually assess their understanding of a concept.

Need and Importance:
Traditional methods of teaching science are not successful in developing interest in science among the students. The 5E model sequences learning experiences so that students have the opportunity to construct their understanding of a concept over time. The model leads students through five phases of learning that are easily described using words that begin with the letter E: Engage Explore, Explain, Elaborate, and Evaluate.

In this context it is important to make a survey about the teaching learning in the classrooms and find out whether the teachers are aware about innovative approaches of science teaching –learning. Instead of just using various techniques and methods as they are given, Effectiveness of various instructional designs should be tested with respect to students achievement.5-E model is one of the most important model based on constructivism and researcher felt the need of testing the effectiveness of the same in science teaching.

Statement:
“To Study the Effectiveness of 5-E Learning Instructional Model on Academic Achievement of 8th Standard Science Students”.

6.4-Objectives:

i. To find out different teaching –learning strategies used by 8th standard science teachers.

ii. To develop a program based on 5-E model of learning for 8th standard science students.

iii. To test the effectiveness of a program based on 5-E model of learning for 8th standard science students.
Operational Definitions:

Academic achievement: represents performance outcomes of 8th standard science students in learning of Physical and Chemical changes in science.

Science: A branch of knowledge or study dealing with a body of facts or truths systematically arranged and showing the operation of general laws: the mathematical sciences.

Research questions:

i. What are various teaching learning methods that teachers use for science teaching?
ii. What is the impact of a program based on 5-E learning model on academic achievement of 8th standard Science students?

Research Hypothesis:

Use of 5-E instructional learning model program positively affects the academic achievement of 8th standard science students in learning physical and chemical changes.

Null hypothesis:

There will be no significant difference in scores of achievements of experimental and control group.

Assumptions:

i. Activity based learning helps students to understand the concepts better.
ii. Innovative methods in science teaching improve the quality of teaching learning.

Scope:

The present research will be conducted in schools in Pune city. The research will be on 8th standard science students with reference to the topic, physical and chemical changes.

Limitations:

i. Results of the program will be dependent on honest responses of respondents.
ii. Factors like intelligence, attitude, and aptitude of students are not taken into consideration.

6.11-Delimitations:

i. The study will be delimited to the schools in Pune city only.
ii. The study will be delimited to 8th standard science students only.
iii. The program will be based on use of 5-E instructional learning model with reference to the topic physical and chemical changes.

Population:

All the schools in Pune city was the population for studying the effectiveness.
All the teachers teaching science in schools in Pune city was the population for finding the teaching learning strategies used.

All the students studying in 8th standard science was the population for experiment.

**Sample:**
10 Schools for survey, 20 teachers teaching science and 50 students studying in 8th standard.

**Significance:**
The present research will be a multi-method research consisting of survey to find out different teaching- learning strategies, the teachers use for teaching science at higher primary level. Program based on 5-E instructional learning model will be developed for science teaching and effectiveness of the program is tested.

**Review of related Literature:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspects</th>
<th>Theoretical reviews</th>
<th>Research reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Different teaching strategies used for science teaching-learning</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5 E Learning instructional Model</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Effectiveness of 5 E learning model</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research Methodology:**

**Present** research is a multi method research which is a combination of survey, program development and experimental method.

**Tools and Techniques used for collection of data:**
1. Survey: Questionnaire
2. Program based on 5 E Instructional Learning Model
3. Experiment: Post tests

**Statistical interpretation tools:**
1. Percentage ,
2. Mean,
3. Standard deviation ,
4. t-test

**Major Findings of the Research**
Findings of the research can be summarized as:
Major Findings of the research

**Objectives** | **Major findings**
---|---
Objective 1  
To find out different teaching – learning strategies used by 8th standard science teachers. | Percentage of meetings of science teachers with other teachers is very poor  
Half of the samples say that they have a good understanding of the science knowledge, skills and attitudes they are to promote in their teaching.  
Most of the students get no chance of work individually with or without assistance of teachers.  
Maximum Percentage of teachers use lecture or lecture- demonstration method for instructions which is followed by experimental method in laboratory where required. Very little Percentage is given for project and cooperative learning while many teacher even are unaware of 5 E instructional learning.  
very less percentage of teachers use various learning resources such as charts, pictures, models, specimens actual examples, technological aids in the classroom.

Objective 3  
To test the effectiveness of a program based on 5-E model of learning for 8th standard science students. | The performance of the Experimental group of students after the program is better than the performance of control group, with respect to 5 E learning instructional model for teaching Physical and Chemical changes.  
**Conclusion:** The program in 5 E learning instructional model for science teaching is effective.

**Conclusion:**
Survey regarding teachers opinions highlights the fact that though teachers feel that science is a subject that can be better understood by active engagement of the students, it is not happening actually in the classroom due to many reasons today. More stress is being given on conventional methods of teaching- learning.

5 E Instructional Learning Model used for 8th standard students for science teaching was found to be very effective as far as the academic achievement of students is considered with respect to the topic, physical and chemical changes.

**References**

Bartholomew H., Osborne J.( 3 MAY 2004), *Teaching students “ideas-about-science”: Five dimensions of effective practice*, DOI: 10.1002/sce.10136

Beverlee Jobrack. *The 5E Instructional Model, Engage Explore Explain Evaluate, EXTEND.*

Bybee, (1997), *Teaching and learning progresses through five phases: Engage, Explore, Explain, Elaborate and Evaluate. The phases of the Primary Connections 5Es teaching and learning model are based on the 5Es instructional model ...retrieved from* https://primaryconnections.org.au/about/teaching Mary land sea grant

Capstone K. H. 2010, The Effects of Using the 5E Instructional Model to Teach Science Concepts to 4th Grade Students Social and Behavioral Sciences Volume 5, 2010, Pages 140–143, WCPCG 2010

Fazelian P., The effect of 5E instructional design model on learning and retention of sciences for middle class students.


Mustafa M. Coskun, Salih et al. (2010), Opinions of prospective teachers about utilizing the 5E instructional model, Faculty of Education, Department of Science Education, Artvin, Turkey; Received: 05 August 2010.


Science teaching reconsidered: A Handbook (1997); Chapter 2; How Teachers teach: specific methods, Different teaching strategies used for science teaching-learning.


Of An Urban School’ Montana State University Bozeman, Montana

Tuna A, Kacar A. The Effect of 5e Learning Cycle Model in Teaching Trigonometry on Students’ Academic Achievement And The Permanence Of Their Knowledge