# The Effectiveness of Science, Technology, Engineering and Mathematics (STEM) Program for Indian Students

**Megha Chaudhary, Gyanendra Nath Tiwari**

*Abstract: This research will provide STEM practitioners with a targeted strategy for designing and integrating STEM content for students; this will enable students to develop a positive attitude towards STEM courses, thereby helping them achieve higher academic performance and improve learning efficiency. The study will also help teachers understand what to do, in order to make the STEM project more effective; will pay attention to the basic factors such as the comfort level of the students in adopting the project; the problems students encounter during the implementation of the plan; parents satisfaction and their support for the selection of the STEM program. This study will be very helpful for school administrators to choose a better STEM course so that they can be implemented in actual classroom situations.*

*Index Term: Introduction; Research Objectives; Research Design; Population; Samples; Sampling Techniques; Tools Used; Statistical Techniques Used; Conclusions;*

## I. INTRODUCTION

Science, Technology, Engineering and Mathematics (STEM), formerly Science, Mathematics, Engineering and Technology (SMET), are terms used to combine these disciplines. This term is often used in school education policies and curriculum to enhance the competitiveness of science and technology development. It has an impact on labour development, national security issues and immigration policies.

Shortly after the science education of the Inter-Agency Meeting organized by the National Science Foundation, chaired by the National Science Foundation Director Rita Coville, this acronym appeared. Peter Faletra, director of the Science Office of the Ministry of Education and Scientist Workforce Development, suggested changing the old acronym METS to STEM. Colwell said that some people don't like the old abbreviation, and he suggested that the National Science Foundation change this. STEMTEC a science, technology, engineering and mathematics teacher education collaboration project at Amherst University in Massachusetts (1998), first made use of the term and since then it became popularly known as STEM. This concept is gaining popularity in India because of its effectiveness and productive results in Education sector. The key focus of STEM is to train our students in a way that they become problem solvers and critical thinkers.

**Megha Chaudhary\*,** Ph.D Scholar, Science Teacher, Delhi Public School, Amity Institute of Education Noida (U.P), India.
**Gyanendra Nath Tiwari,** Ph.D Scholar, Science Teacher, Delhi Public School, Amity Institute of Education Noida (U.P), India.

The idea is to bridge the gap between tech savvy to innovator to entrepreneur. Government of India is supporting this idea by stipulating grants to schools to set ATL Tinkering labs in schools. What makes STEM different from traditional teaching is the approach and pedagogy used while teaching. In STEM the students are not told solutions to the problems rather they are given certain challenges and are asked to find all the possible solutions to it. Brainstorming and lots of discussion are the pillars of STEM. This study is targeted to find the real term outcomes of STEM program in our schools.

## II. RESEARCH OBJECTIVES

1. To find out the significant difference in the attitude of students towards STEM program based on gender before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the attitude of male group before (pre-test) and male group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the attitude of female group before (pre-test) and female group after (post-test) the conduction of STEM programme.

2. To find out the significant difference in the achievement of students towards STEM program based on gender before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the achievement of male group before (pre-test) and male group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the achievement of female group before (pre-test) and female group after (post-test) the conduction of STEM programme.

3. To find out the significant difference in the attitude of students towards STEM program based on economic background before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the attitude of economically upward group before (pre-test) and economically upward group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the attitude of economically downward group before (pre-test) and economically downward group after (post-test) the conduction of STEM programme.

4. To find out the significant difference in the achievement of students towards STEM program based on economic background before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the achievement of economically upward group before (pre-test) and economically upward group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the achievement of economically downward group before (pre-test) and economically downward group after (post-test) the conduction of STEM programme.
5. To find out the significant difference in the attitude of students towards STEM program based on intelligence before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the attitude of above average group before (pre-test) and above average group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the attitude of below average group before (pre-test) and below average group after (post-test) the conduction of STEM programme.

6. To find out the significant difference in the achievement of students towards STEM program based on intelligence before (pre-test) and after (post-test) the conduction of STEM programme.
   i. To find out the significant difference in the achievement of above average group before (pre-test) and above average group after (post-test) the conduction of STEM programme.
   ii. To find out the significant difference in the achievement of below average group before (pre-test) and below average group after (post-test) the conduction of STEM programme.

7. To find out the significant difference in the attitude before (pre-test) STEM programme and attitude after (post-test) STEM programme among students in general.
8. To find out the significant difference in the achievement before (pre-test) STEM programme and achievement after (post-test) STEM programme among students in general.
9. To find out the significant relationship in the attitude and achievement before (pre-test) the conduction of STEM programme among students in general.
10. To find out the significant relationship in the attitude and achievement after (post-test) the conduction of STEM programme among students in general.

## III. RESEARCH DESIGN

In this study, a pre-experimental research design viz. pre-post-test research designs will be used.

### A. POPULATION

All the elementary students of 2 Government schools and 2 private schools of West Delhi will be taken as the population for research.

### B. SAMPLE

A sample of 300 elementary students will be chosen as the actual sample for the present study.150 from the government and 150 from the private school.
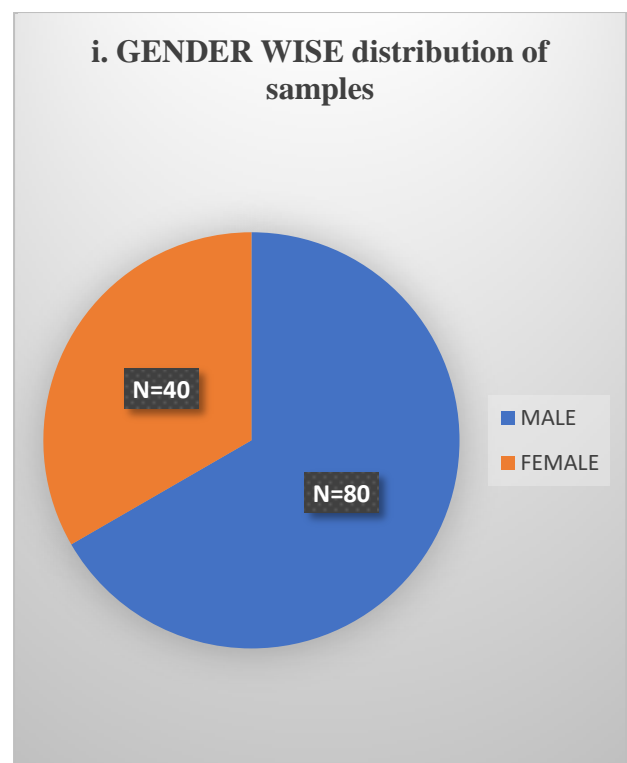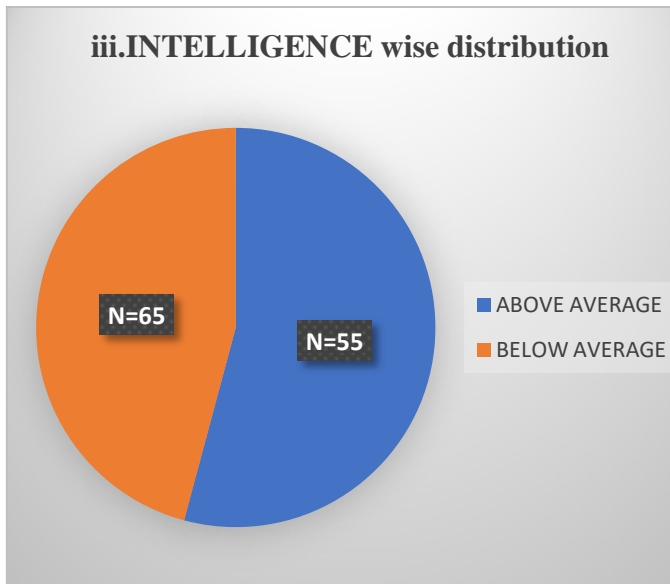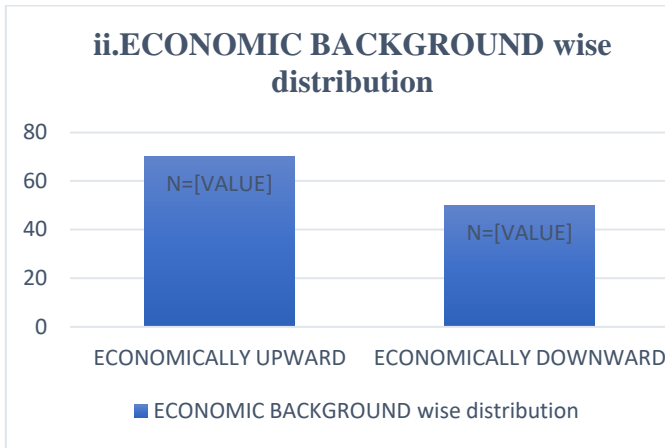
### C. SAMPLING TECHNIQUE

Incidental and Purposive sampling technique will be used to select 300 actual sample.

**Table showing distribution of the sample:**

| SAMPLE | Number(N)= 300 | |
|---|---|---|
| GENDER | MALE | N=50 |
| | FEMALE | N=50 |
| ECONOMIC BACKGROUND | ECONOMICALLY UPWARD | N=50 |
| | ECONOMICALLY DOWNWARD | N=50 |
| INTELLIGENCE | ABOVE AVERAGE | N=50 |
| | BELOW AVERAGE | N=50 |

**Figures showing distribution of the samples:**



i. GENDER WISE distribution of samples

N=40
N=80
MALE
FEMALE

## ii.ECONOMIC BACKGROUND wise distribution



## iii.INTELLIGENCE wise distribution



students of DPS Greater Faridabad. If the prediction turns out to be untrue the researcher will try to find out the reason Why the STEM programme is not effective or what steps should be taken to bring about those changes.

Hence; study effectiveness will be measured in terms of attitude and achievement. If the attitude towards STEM is positive Achievement is predicted to be high and as a result Effect of STEM will be high.

### REFERENCE

1. Atkinson, R. D. (2012). Why the current education reform strategy will not work. Spring 2012 Science and Technology Issues: 29-36.
2. Breiner, J. M., S. S. Harkness, C. C. Johnson and C. M. Koehler. (2012). What is STEM? On the concept of STEM education and partnership. School Science and Mathematics, 112(1): 3-11.
3. Bybee, R. W. (2010). Advance STEM Education: Vision 2020. Technical and Engineering Teacher, September 2010: 30-35.
4. Wang, H., T. J. Moore, G. H. Roehrig and M. S. Park. (year 2011). STEM integration: teacher perception and practice. University preparatory engineering education research. 1 (2): 1-13.

### D.  *D. TOOLS USED*

i. **Interview schedule-** It will comprise research questions.

ii. **Attitude test-** This will be prepared and standardised by the researcher. Reliability and validity of the tool will be found out by conducting pilot study.

iii. **Achievement test-** It will be prepared and standardised by the researcher. Reliability and validity of the tool will be found out by conducting pilot study.

### IV.  STATISTICAL TECHNIQUES USED

i. **T-test-**will be done for analysis of Objectives 1-8 related hypotheses.

ii. **R-ratio-** will be done for analysis of Objectives 9 and 10 related hypotheses.

### V.  CONCLUSION

In the present study the researcher will manipulate the independent variables:

-The researcher tries to find the conclusion as to whether STEM programme will be effective or not to the elementary students of DPS Greater Faridabad so that it can be used to improve academic achievement among them.

-The researcher predicts the conclusion that STEM programme will bring a positive change in attitude which in turn will bring about a higher achievement i.e STEM programme will be effective among elementary school