

## **Use of Teaching Learning Material in Physics Teaching Learning Process At Secondary Level**

**Poulami Mukherjee**

*Department of Education, The University of Burdwan*

---

**ABSTRACT:** *Development of scientific attitude is essential in recent times. This can be done through proper education. Teaching of science in proper way is highly essential. In the present research work, some topics are selected from Physical Science syllabus of class IX. The same topic is taught to the learners using traditional method as well as demonstration method and the effectiveness of the teaching methods is studied. It was found that teaching using demonstration method is more effective than traditional method. Systematic presentation using demonstration method enables learners to develop clear concepts and ideas.*

**KEY WORDS :** *Lecture method, demonstration method, t-value, teaching-learning material, test of significance etc.*

---

Date of Submission: 10-06-2021

Date of Acceptance: 25-06-2021

---

### **I. INTRODUCTION**

The study of science starts with observations and experiments. All natural phenomena is made up of cause-effect relationship. Scientific discoveries are possible through intense research work and use of logic and intellect that have made human life more comfortable. Study of science is very essential at all levels of education. Development of reasoning ability among learners helps to grow scientific attitude and logical interpretation of different phenomena. The present research work includes study of Physics, a branch of science, through use of teaching-learning materials at Secondary level. Here, the topics, verification of Newton's second and third law of motion, and conservation of linear momentum, which are included in syllabus of Physical Science of class IX (West Bengal Board of Secondary Education) are taught to the students using both traditional method and demonstration method and the result is compared.

Demonstration method is a systematic presentation and explanation of a process which can be observed. Demonstration method enables to draw attention of all students of class. It enables explanation of abstract ideas into concrete forms.

### **II. OBJECTIVES**

The present study includes the following objectives –

1. To teach the learners using traditional method of teaching.
2. To teach the learners using demonstration method of teaching.
3. To develop and validate achievement test questionnaire.
4. To study the effectiveness of each method among boys and girls studying in Secondary Schools of Burdwan district.
5. To compare and to find out the use of which method is more suitable for students' teaching-learning purpose.
6. To find out to what extent the learners are able to appreciate their learning, and to what extent they grow interest in it.

### **III. RESEARCH METHODOLOGY**

The present study is conducted to study the effectiveness of use of teaching method. 100 (50 boys and 50 girls) students are selected as samples of study. Firstly, the topic is taught to the students (control group) using traditional lecture method. An achievement test is constructed, the learners are asked to solve it, and the obtained scores are evaluated. In the next step, the same topic is taught to the students (experimental group) using demonstration method of teaching. The method of teaching is described as follows-

- 1) Verification of Newton's Second law of motion using the following demonstration model-

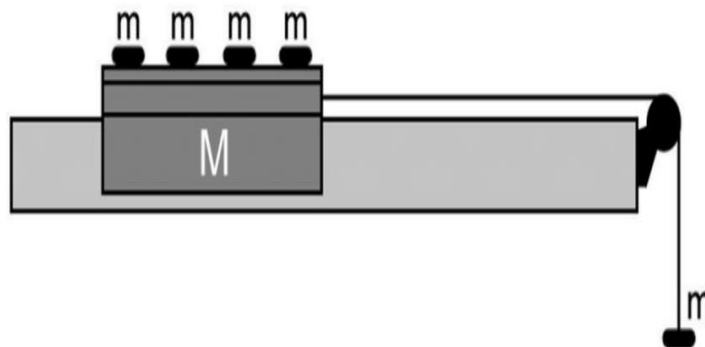
Required equipments are –

- a) a smooth running cart
- b) pulley
- c) thread

d) weights

A smooth running cart is attached to a weight 'm' with the help of a string passing over the pulley. The cart begins to move slowly. In the next step, when value of weight 'm' is increased, the velocity of the cart increases with time. So, we can say more is the weight 'm', more will be the acceleration of the cart. That is, acceleration of the cart is proportional to the force that pulls the cart and the change in motion takes place towards the direction of force. This verifies Newton's Second law of motion.

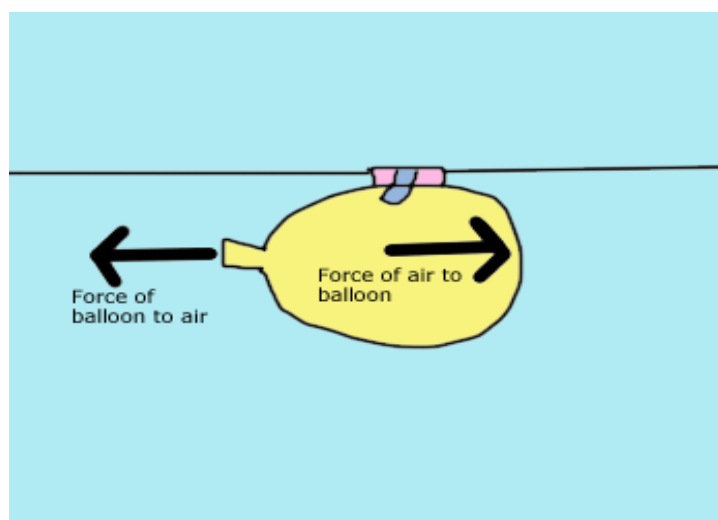
The diagrammatic representation of the above demonstration is shown below (figure 1)-



*Figure 1 : Required model to verify Newton's Second law of motion*

2) Verification of Newton's third law of motion using the following demonstration model-

According to Newton's third law of motion, every action has an equal and opposite reaction. This is demonstrated using a simple experiment as shown in figure 2. In this experiment, a balloon is filled with air and tied to a string using a tape. The tape is attached loosely to the string so that the balloon can move. After preparing the set up, the air inside the balloon is allowed to go out. It is found that when the air goes out, the balloon begins to move in the opposite direction. This can be explained using Newton's third law of motion, that is, a force of air is acting towards the left side of balloon. Same amount of force is acting on opposite side on the balloon which enables the balloon to move forward through the string.



*Figure 2 : Required model to verify Newton's Third law of motion*

The same achievement test questionnaire is given to the learners, they are asked to give correct responses. The scores obtained by teaching using traditional method and demonstration method are evaluated and compared.

3) Demonstration of conservation of linear momentum –

The demonstration that explains conservation of linear momentum is shown in figure 3. In the given setup, 5 balls of same mass are hang from a fixed support using flexible string. When force is applied to ball 1, from left side, it is found that ball 5 moves to right side with same amount of deviation. This explains that

momentum is conserved (neglecting frictional forces). Since the mass of all the balls are same, what actually happens is, the velocity, with which ball 1 move from left side towards ball 2, gets transferred to ball 3. Similarly, velocity of ball 3 gets transferred to ball 4, velocity of ball 4, and gets transferred to ball 5. The detailed of this transformation i.e. pre-impact and post-impact is shown in figure 4. Since there are no more balls beside ball 5 on the right side, it is found that ball 5 moves to the right side with same amount of velocity and same amount of deviation.

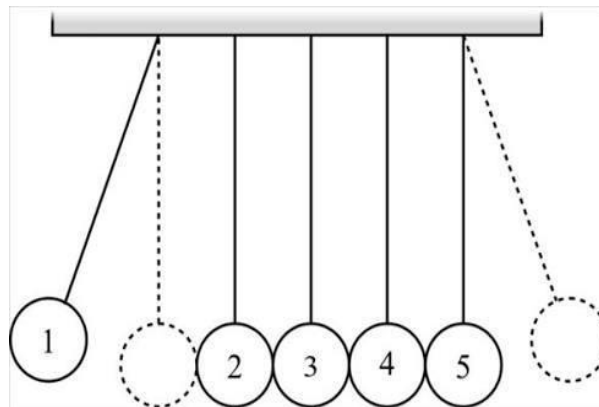


Figure 3 : Required model to verify conservation of linear momentum

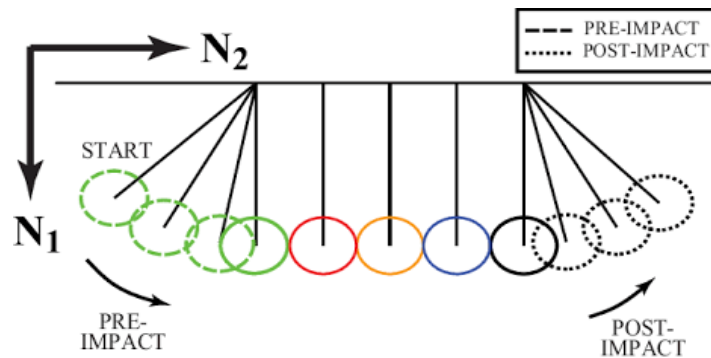


Figure 4 : Transformation of linear momentum

If two balls(ball 1 and 2) are pulled out from left side, it is found that 2 balls (balls 4 and 5) will deviate on the right side following conservation of linear momentum.

#### IV. STATISTICAL ANALYSIS OF DATA

The following hypotheses are set up to test the significance of teaching using traditional and demonstration method of teaching-

**Hypothesis H<sub>01</sub>** : There is no significant difference between the achievement scores obtained by teaching boys of Secondary Schools (Bengali medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Control	50	55.08	3.38	0.991	15.61	significant	significant
Experimental	50	70.55	6.14				

Our obtained t-value  $\gg$  critical value of t, for 48 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the hypothesis  $H_{01}$  is rejected. That is, significant difference exists between the achievement scores obtained by teaching boys of Secondary Schools using traditional approach and demonstration approach.

**Hypothesis H<sub>02</sub>** : There is no significant difference between the achievement scores obtained by teaching girls of Secondary Schools (Bengali medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Experimental	50	65.15	4.14	0.751	13.608	Significant	Significant
Control	50	54.93	3.33				

Our obtained t-value  $\gg$  critical value of t, for 48 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the *hypothesis H<sub>o2</sub> is rejected*. That is, significant difference exists between the achievement scores obtained by teaching girls of Secondary Schools using traditional approach and demonstration approach.

**Hypothesis H<sub>o3</sub>** : There is no significant difference between the achievement scores obtained by teaching all students of Secondary Schools (Bengali medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Experimental	100	75.73	4.02	0.514	39.53	Significant	Significant
Control	100	55.41	3.21				

Our obtained t-value  $\gg$  critical value of t, for 98 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the *hypothesis H<sub>o3</sub> is rejected*. That is, significant difference exists between the achievement scores obtained by teaching all students of Secondary Schools using traditional approach and demonstration approach.

**Hypothesis H<sub>o4</sub>** : There is no significant difference between the achievement scores obtained by teaching boys of Secondary Schools (English medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Control	50	54.12	3.39	0.754	15.15	significant	significant
Experimental	50	65.55	4.12				

Our obtained t-value  $\gg$  critical value of t, for 48 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the *hypothesis H<sub>o4</sub> is rejected*. That is, significant difference exists between the achievement scores obtained by teaching boys of Secondary Schools (English medium) using traditional approach and demonstration approach.

**Hypothesis H<sub>o5</sub>** : There is no significant difference between the achievement scores obtained by teaching girls of Secondary Schools (English medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Control	50	51.08	3.37	0.843	15.97	significant	significant
Experimental	50	64.55	4.92				

Our obtained t-value  $\gg$  critical value of t, for 48 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the *hypothesis H<sub>o5</sub> is rejected*. That is, significant difference exists between the achievement scores obtained by teaching girls of Secondary Schools (English medium) using traditional approach and demonstration approach.

**Hypothesis H<sub>o6</sub>** : There is no significant difference between the achievement scores obtained by teaching all students of Secondary Schools (English medium) using traditional approach and demonstration approach.

t-value is calculated in the table given below to test the level of significance-

Group	Total number of samples	Mean	Standard deviation	Standard error	t-value	Test of significance	
						0.05 level	0.01 level
Experimental	100	73.74	5.01	0.604	35.34	Significant	Significant
Control	100	52.39	3.39				

Our obtained t-value  $\gg$  critical value of t, for 98 degrees of freedom, both at 0.05 and 0.01 level of significance. Hence, it can be said that the *hypothesis  $H_0$  is rejected*. That is, significant difference exists between the achievement scores obtained by teaching all students of Secondary Schools using traditional approach and demonstration approach.

## V. FINDINGS AND DISCUSSION

The present research work shows that teaching using demonstration method is more effective than teaching using traditional method. The results can be generalized considering more number of samples and using different methods of teaching. It will be worthwhile that if necessary funds is provided by different organisations as well as Government so that the Schools can afford instruments and necessary teaching-learning materials for teaching purpose. At present, most of the Schools have computers. Power point presentation of experimental demonstrations by making use of Computer Assisted Learning software and technology will be a highly effective tool for teaching.

## VI. CONCLUSIONS

Study of Physics explains natural phenomena on basis of laws of nature. It explains different properties and all physical happenings around us. So, study of Physics is essential and it can be taught through different approaches. In the present study, teaching of a unit of Physics using demonstration method is proved to be very fruitful and effective. Use of different methods of teaching at different times makes learning joyful and interesting. Since a long time back, different Communities and Commissions have emphasized Science education and have put efforts on appropriate use of teaching methods and teaching-learning materials to develop Science as a discipline of mind. Students are the future of society. Modern methods of teaching Science based on investigatory approach enables learners to understand basic principles, develop scientific temperament and apply it in their own life, which will be beneficial for themselves, for the society and, in turn, for the nation.

## REFERENCES

- [1]. Aggarwal, Y.P. (1990). Statistical methods. New Delhi : Sterling Publishers, Pvt. Ltd.
- [2]. Best, J.W. (1977). Research in Education. New Delhi: Prentice Hall of India, Pvt. Ltd.,
- [3]. Koul, L. (2005). Methodology Of Educational Research. New Delhi : Vikas Publishing House (P) Ltd.
- [4]. Narasaiah, M.S. (2007). Education and Human Resource Development. New Delhi: Discovery publishing House.
- [5]. Sharma, R.C. (2000). Modern Science Teaching. New Delhi : Sterling Publishers, Pvt.Ltd.
- [6]. Udaiveer .(2004). Modern Basic Education. New Delhi : Anmol Publisher (P) Ltd.

Poulami Mukherjee, "Use of Teaching Learning Material in Physics Teaching Learning Process At Secondary Level." *International Journal of Humanities and Social Science Invention (IJHSSI)*, vol. 10(06), 2021, pp 26-30. Journal DOI- 10.35629/7722