



## USE OF LOW COST-NO COST TEACHING MATERIAL BY ELEMENTARY SCHOOL TEACHERS IN TEACHING OF SCIENCE

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### Abstract

*The present study is designed to investigate use of low cost-no cost teaching material by elementary school teachers in teaching of science. The descriptive survey method was used in the study. The study was delimited to the elementary schools of Moga District of Punjab. In order to conduct the study, 50 government elementary schools were selected randomly from Moga district of Punjab. The data was collected from the 100 science teachers of the schools. A self constructed check list was used to collect the data. Average, percentage was used for data analysis. The main findings show that 53% of elementary schools have availability of low cost/ no cost teaching material and 47% of elementary schools do not have low cost/ no cost teaching material, 47% teachers involve themselves in preparation of low cost/ no cost teaching material, whereas 53% of teachers do not involve themselves in preparation of low cost/ no cost teaching material, 49% of elementary school science teachers use low cost/ no cost teaching material, whereas 51% of elementary school science teachers do not use low cost no cost teaching material in teaching of science and It was founded 88% of science teachers believed that low cost/ no cost teaching material is helpful in changing behavior of students, whereas 12% of science teachers think that low cost/ no cost teaching material is not helpful in bringing change in students' behavior.*

**Keyword:** *Low Cost, No Cost, Teaching Material, Elementary School, Science*

### Introduction

Indian education commission (1964-66) defined the Education ought to be related to the life, need and aspirations of the people and thereby made powerful instrument of social economic and cultural transformation. Teacher is a very important part of education. Teacher is the custodian and architect of student's future. The future of every country is in the hand of teacher. Teachers play a vital role in fostering the intellectual and social development of children during their formative years. The education that teachers impart plays a key role in determining the future prospects of their students, whether in pre-schools or high schools or in private or public schools, teachers provide the tools and the environment for their students to develop into responsible adults.

Teachers act as facilitators or coaches, using classroom presentations or individual instruction to help students learn and apply concepts in subjects such as science, mathematics, or English. They plan, evaluate, and assign lessons; prepare, administer, and grade tests; listen to oral presentations; and maintain classroom discipline. Teachers observe and evaluate a student's

performance and potential and increasingly are asked to use new assessment methods. For example, teachers may examine a portfolio of a student's artwork or writing in order to judge the student's overall progress. They then can provide additional assistance in areas in which a student needs help. Teachers also grade papers, prepare report cards, and meet with parents and school staff to discuss a student's academic progress or personal problems. Many teachers use a "hands-on" approach that uses "props" or "manipulative" to help children understand abstract concepts, solve problems, and develop critical thought processes. For example, they teach the concepts of numbers or of addition and subtraction by playing board games. As the children get older, teachers use more sophisticated materials, such as science apparatus, cameras, or computers. They also encourage collaboration in solving problems by having students work in groups to discuss and solve problems together. To be prepared for success later in life, students must be able to interact with others, adapt to new technology, and think through problems logically. It is the, who has the privilege of shaping and moldings the habits, interests, attitudes, sentiments, behavior, and character of pupil.

#### Elementary Education

Elementary education in India means eight years of schooling from the age of six. The government has made elementary education compulsory and free. During "Sarve sikhsha Abhiyan" primary schools are upgraded and they named as elementary schools. Elementary schools provide education from class 1<sup>st</sup> to class 8<sup>th</sup>. The children in these classes are generally aged between five to fourteen. The major goal of elementary education are achieving basic literacy and numeracy amongst all pupils, as well as establishing foundations in science, geography, history, and other social sciences.

Science plays an ever increasing role in the modern civilization. It is our primary duty to see that every individual should have at least an elementary knowledge of the scientific principles involved in everyday life. Teaching of science is not mere transaction of science based knowledge so as to load students' mind with facts and figures. At elementary level, science is taught through theory as well as practical. All though, at higher education a part of science tends towards more abstract and theoretical, but at lower stage, experimentation and demonstrations are essential components for explaining many of the concepts. So often we say 'Science is Doing' because it is highly desirable to incorporate activities, supporting the theoretical teaching so as to leave a permanent impression of understanding. While teaching the topic, if the phenomenon is explained by doing an actual experiment makes teaching more effective. Science has played a tremendous role in our lives during the last century and it now changing our entire existence in such important aspects of health/ communication, transformation power. To visualize what science has done for man, it is simply necessary to sit in a modern room and look around. Science is universal and so can be its benefits. Its material benefits are immense and far reaching industrialization of agriculture and release of nuclear energy, mention two examples- but even more profound is its contribution to culture.

The general aim of science education is to helping development of well defined abilities in cognitive and affective domains, besides enhancing psychomotor skills. It helps to faster an uninhibited spirit in inquiry, characterized by creative, innovative and objective approaches. Educational programs are designed to help unravel the mysteries of the inter relationship between science and day to day life, health, agriculture, industry, and indeed, the individual and universe.

The emphasis on science education can be observed in the educational policies of the developing countries. In India, through the effect of national council of educational research (NCERT), science has been made a compulsory throughout the school stage.

Teaching aids provide a stimulus for exploration and thinking. With the added input of verbal, personal communication with an adult interaction and discussion arise.... And these are crucial to real, activity based learning. Adults and older children, help younger ones to interpret sensory and language experiences to clarify them and relate them to their previous understandings. Children that learn by blending language with experiences, they learn to think. For maximum mental growth and personality development, a child's life needs to be filled with stimulating, encouraging experiences. Appropriate learning materials (teaching aids) help children to develop their innate abilities.

About 98% of all incoming information to the brain comes through the senses. Add to that the fact that over 87% of the learners in the classroom prefer to learn by visual and tactile means and you have a recipe for failure if the primary methods of teaching are auditory. In *Growing up Digital* (1998), Don Tap Scott said that this generation prefers to be active participants in all that they do.

### **Low-cost / No-cost teaching material**

There is a paradigm shift in classroom pedagogies used by teachers around the world. Conventional teaching-learning methodologies are fast giving way to newer, innovative and efficient pedagogies. Chalk-and-talk though not fully redundant, has become somewhat obsolete and is considered pitifully inadequate in the contemporary educational scene. All over the world teachers are innovating new teaching aids to make teaching-learning processes more interesting and effective. Learning takes place when the environment is exciting and active. Making and using teaching and learning materials is an important part of teaching in many parts of the developing world there are few manufactured teaching materials for purchase and if they are available tend to be very expensive.

Import of teaching material from other countries at a given level are a heavy financial burden for a developing country like India. Low-cost teaching material is that which produced by the factories of local areas of the country. Its spare parts are also easily approachable and its cost is always low than imported equipments from other countries. Low - cost teaching aids involve minimal or nil input costs as they are made from household waste and discarded items or from materials readily available in our immediate surroundings and natural environments.

Some times the standard teaching aids may remain out of reach – may be due to any reason. Look around, quit possible one gets something from the surrounding, which may serve as a better teaching aid for the topic. A step further, perhaps he who is innovative, may prepare such an aid for the available materials from here and there, low cost-no cost teaching material is the term that refers to an offhand construction of a teaching aid with simple available materials costing little or nil. No-cost teaching material is mater is that which a teacher can use by carrying it from local sources. It may waist things which a teacher can use as a teaching aid. Low-cost teaching aids can be used in nursery, primary, middle, secondary and senior secondary schools. Of course, the type as well as number of aids to be used in a given subject would vary from one class to another. But broadly speaking, primary and middle school students can be engaged in making simple items with rudimentary materials such as bits of paper, cardboard and thermocol using scissors, glue etc, whereas senior school students could develop teaching aids using metal, wood, plastic, rubber etc.

### **Advantage of Low cost- No cost teaching material**

The major concerns of developing countries are food supply, livelihood, health, nutrition and growth and economy. At the level of the student and his family, food, health, and livelihood are primary concerns. In developing the need is great for self-reliance in (science) teaching at country level and more importantly at teacher level. The use of Low-cost/No-cost teaching material for science education has certain important advantages in developing countries like India:-

- Cheapness:-Investments in equipment for all students at a given level are a heavy financial burden for a Developing country. Essential follow-up procedures like teacher training in the pedagogical and technical use of the equipment, provision of maintenance, and replenishment, etc., are sometimes not accomplished because of the lack of funds.
- No fear of loss:-There is another risk in connection with the high cost of equipment. It is sometimes safely locked up in the school and not used at all, because the teacher is afraid that he/she or the students might break it and that he/she will have pay for it from his/her own pocket.
- Proper use:-The costs of locally produced equipment are often but no always, lower than the imported equipments. When calculating the cost of the equipment some factors should be kept in mind. They are durability of the equipment, additional installation costs, service costs, cost of teacher and technician training. We should also kept in mind that most expensive equipment is that which is never used.
- Same principles:-Low cost equipments illustrate the same principles as imported expensive equipments.
- Maintenance and repair: - If equipment is simpler in design, teachers, laboratory technicians and local craftsmen are more likely to be able to carry out small repair.
- Relevance to the curriculum: - In practice, development of low cost equipment are often at the sometime involved in curriculum design.
- Higher school content:- Equipment made of parts and material familiar to the students is more likely to help the students.
- Self reliance: - It cultivates confidence and expertise to educator in developing country.
- Related to real life:-Teacher need to realize the significance of practical work in science education as well as the use of social resources in laboratory activities.
- Economic:-It is very difficult to establish science laboratories and demonstration rooms due to financial constraints. many science equipment for several experiments can be produced under their low cost variety.
- Helpful for teacher:-Because of overcrowded classroom, teacher cannot provide individual attention to students.
- Active method, Group work, Fun:-Making and using low cost equipment encourage the active method and group work can be great fun, each pupil can make his or her own equipment and even bring it home. It is the active method of learning.
- Strength:-Made of paper, wood, metal, string etc such equipments can be treated roughly with no damage. Hence pupils feel more at ease.

Envisaged changes in the curriculum are sometimes not taken into account in connection with equipment purchase, even if they are supposed to happen in the near future. On the other hand, in practical implementations of the curriculum there is sometimes little or no time allotted for practical work. Another possibility is that the educational value of the experiments is low because they fail to demonstrate scientific concepts convincingly, or do not illustrate the

connection between scientific principles and the real world. The reasons might be use of unfamiliar materials, practical work following 'cookbook recipes' without real understanding of the process, or use of 'black boxes' - unexplained and unfamiliar equipment where input and output do not have any apparent connection.

Low-cost teaching aids can be used for supplementary and illustrative education in the sciences as well as the humanities. However, they are most suitable for subjects like science, geography, mathematics and art and crafts. In a resources-starved economy such as India where the masses need to be educated about how to properly dispose household waste and used items and huge piles of garbage and trash is dumped on roadsides and street corners, low-cost teaching aids made from household waste and trash serve a particularly useful purpose. With a bit of creativity and imagination, scraps of metal, wood, plastic, rubber, paper etc can metamorphose into valuable items, which can be used as effective teaching tools. System-wide use of low-cost teaching aids will not only boost teacher/student creativity and involvement, help institutional budgets go a longer way, but also serve to keep our immediate environments clean. The equipment is not always relevant to the curriculum. In other words, it is designed for experiments that do not suit the curriculum.

Investment in equipment for all students at given level is a heavy financial burden for a developing country like India. Foreign exchange is usually scarce, while the equipment is rather expensive, considering the large number of schools. This result is uneven and only practical supply of schools. Developed and produced on campus, they help institutions become self-reliant and reduce costs of education. Incremental and selective use of low-cost teaching aids makes the process of teaching and learning more varied, interesting and effective.

Available equipment is not always relevant to the curriculum. In other words, it may design for experiments that do not suit the curriculum. Envisaged changes in the curriculum are sometimes not taken into account in connection with equipment purchase, even if they are supposed to happen in the near future. On the other hand, in practical implementations of the curriculum there is sometimes little or no time allotted for practical work. Another possibility is that the educational value of the experiments is low because they fail to demonstrate scientific concepts convincingly, or do not illustrate the connection between scientific principles and the real world. The reasons might be use of unfamiliar materials, practical work following 'cookbook recipes' without real understanding of the process, or use of 'black boxes' - unexplained and unfamiliar equipment where input and output do not have any apparent connection.

### **Significance of the problem**

Science is the most important subject and it helps to develop the problem solving, reasoning power, creativity of the students. We can say that science prepare a child to life. Science courses are becoming difficult not only due to conceptually difficult content but also due to our formal and didactic approach of teaching science. This process of teaching and learning of Science doesn't fascinate the students and hence learning of science becomes only a tool to get a decent looking job. To make science understandable perceivable and enjoyable teachers use different techniques .To understand the scientific process of any concept teaching material is very necessary. For developing it very much financial burden to purchase expensive teaching material from other countries. We are going to observe that up to which extent low cost /no cost teaching is used in elementary school. Because at elementary stage concept are not very much complex, they can be understand with the help of easily approachable teaching materials like no cost low cost teaching materials. India is developing country, in India most of the population

lives under poverty. Due to the economic problem Govt. can't supply the required expensive teaching material to all schools. Lack of teaching material may create some learning problems. To find out the solution teacher can use low cost / no cost teaching material in teaching of science. This study is important to explore the use of low cost - no cost teaching material at elementary level. So investigator feel tempted to study the availability and usages of low cost no cost teaching material by elementary school teachers in teaching of science. The focus of this study is on use of low cost- no cost teaching material by the elementary school teachers in teaching of science.

### **Operational definition of the term used**

Appropriateness use of available waste materials as low cost-no cost experimental arrangement, model, project or activity lead to development of creative skill and through the creative skills the child acquires the basic objective of learning science-viz. Knowledge, Understanding and Application. It will be achievement for a teacher, if he can bring a situation where he uses low cost- no cost teaching material and his student comes forward with a new idea to create of his own for the next one.

### **Objectives**

1. To study the availability of low cost no cost teaching material in elementary schools
2. To evaluate the involvement of teachers in preparation of low cost- no cost teaching material
3. To assess the use of low cost/ no cost teaching material by elementary school teachers in teaching of science
4. To study the behavioral change in students while studying with the help of Low Cost /No Cost Teaching Material in teaching of science in Elementary Schools.

### **Review Related Literature and Present Study**

The researcher had consulted the related literature as requirement of the problem. There were so many studies conducted on science education, importance of teaching material, need of training program to make teaching effective at all stages. Some studies emphasized on preparation of low cost/no cost teaching material at country level in developing countries like India, Pakistan etc. but no one study was found which tell us about availability and use of low cost/no cost teaching material at elementary level in India. The focus of this study is on use of low cost no cost teaching material by elementary school teachers in teaching of science. For it we have to study the availability of low cost/ no cost teaching material, explore the level of teachers involvement in preparation of low cost/ no cost teaching material, asses the usage of low cost/ no cost teaching material by teachers and to see the behavioral change through use of low cost / no cost teaching material in students.

### **Research method**

#### **Sample**

The study was conducted on the government elementary schools in Moga district of Punjab. The data was collected from elementary school science teachers of Moga district of Punjab. The sampling frame was selected from the list of the schools available with DEO office, the official website of Punjab school education board Mohali Punjab. According the list is issued by DEO office Moga.

In order to conduct the study, 50 government elementary schools were selected randomly from Moga district of Punjab. Data was collected from the 100 science teachers of the schools to

know the availability, involvement of students in preparation, use of low cost no cost teaching material and to see the behavioral change in students with the use of low cost no cost teaching material.

Simple random sampling technique was used to select the schools from the available list of elementary schools.

### **Tool of data collection**

Tools are nothing but the instruments that help the researcher to gather data. naturally, the type of information you gather depends upon the kind of tools you have used for the purpose. The selection of a tool depends upon objectives and design of the study and the type of respondents you intend to cover. For the purpose of data collection the investigator used a self made check list.

### **Check List for low cost /No cost teaching material**

List of a research or survey Statements asked to respondents, and designed to extract specific information. It serves four basic purposes: to (1) collect the appropriate data, (2) make data comparable and amenable to analysis, (3) minimize bias in formulating and asking statements and (4) to make Statements engaging and varied. The self made Check List was used to collect the information about use of low cost/ no cost teaching material and availability of low cost/ no cost teaching material in elementary schools of district Moga of Punjab.

### **Construction of Tool**

The objective of the present study was to study the availability, involvement of students in preparation, use of low cost no cost teaching material and to see the behavioral change in students with the use of low cost no cost teaching material. According to the best knowledge of the investigator no standardized tool was available on low cost no cost teaching material. Therefore there was a need to construct such type of statements on low cost no cost teaching material. In order to frame relevant items, investigator explored various sources of information like books, journals, magazines, newspapers and internet. Initially 42 items were included in the first draft of the check list namely "Evaluation of low cost/ no cost teaching material". It was then shown to various experts and keeping in view their suggestions some items were deleted as well some were modified and even added. Eventually, final draft of the check list was prepared comprising of 32 items.

### **Administration of the Check List**

This check list can be administered individually or to a large group at a time. After establishing a good rapport, the subject can be asked to respond to anyone alternative of each statement by marking tick mark (√) against it under 'Yes' or 'No' options. There is no time limit to the check list for recording the respondents and the average time needed to give responses is usually around 20 minutes.

### **Scoring**

In the present check list, only two alternative responses were given to the respondents i.e. 'Yes' or 'No'. The scoring of check list is based on two alternatives Yes or No. In item no 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 24, 26, 28, 29, 30, 31 and 32 'Yes' response was considered as positive items and item no 19,22,23,27 considered as negative items. All items scored as per the table showing to get the percentage and declare the results.

**TABLE: 1**  
**Scoring of Items**

Items	Response	Marks
Positive items	Yes	1
	No	0
Negative	Yes	0
	No	1

Table 1 depicts in case of positive items for each 'Yes' response the investigator marked '1' and for each 'No' response, '0' was marked in case of negative item marked 1 for no response and 0 for yes response.

### **Statistical Techniques**

Tabulated data have no meaning unless analyzed and interpreted by some sophisticated statistical techniques to arrive at scientific conclusions. It involves breaking up the complex arrangement for the purpose of interpretation. So it needs the application of statistical techniques. Average, percentage was used for data analysis in the present study.

### **Results**

Results show that 53% of elementary schools have availability of low cost/ no cost teaching material and 47% of elementary schools do not have low cost/ no cost teaching material.

Results shows that 47% teachers involve themselves in preparation of low cost/ no cost teaching material, whereas 53% of teachers do not involve themselves in preparation of low cost/ no cost teaching material.

Results shows that only 49% of elementary school science teachers use low cost/ no cost teaching material, whereas 51% of elementary school science teachers do not use low cost no cost teaching material in teaching of science.

It was founded 88% of science teachers believed that low cost/ no cost teaching material is helpful in changing behavior of students, whereas 12% of science teachers think that low cost/ no cost teaching material is not helpful in bringing change in students' behavior.

### **Discussion**

1. It is found that there is very less availability of low cost/ no cost teaching material in elementary schools for teaching of science. To some extent there is availability of readymade teaching material, very few teacher buy low cost/ no cost teaching material personally, funds are not much sufficient, only some school has science kits. Availability of science of raw material in not satisfactory.
2. It was found that there is below average involvement of teachers in preparation of low cost/ no cost teaching material in teaching of science. Involvement of students in preparation of low cost/ no cost teaching material is very less, below average teachers spend enough time in preparation, there are so many problems in preparation, above average teachers have attended the workshops conducted by the respective department but only few teachers get extra training for preparation of low cost/ no cost teaching material.
3. It was concluded that there is below average usability of low cost/ no cost teaching material in elementary schools in teaching of science. Low cost/ no cost teaching material is not used



for every topic by teachers, it demands extra time for plan a lesson and it is very time consuming.

4. In relation to the fourth objective study regarding the behavioral change through low cost/ no cost teaching material found that it is very helpful in bringing the positive behavioral change in students. It develop scientific attitude, provide natural way of learning, provide first hand experiences, helpful in handling apparatus, helpful in better understanding of complicated topics and motivate the student for physical and mental activities.

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