

**USE OF LOW COST-NO COST TEACHING MATERIAL BY ELEMENTARY
SCHOOL TEACHERS IN PEDAGOGY OF SCIENCE: AN EVALUATIVE STUDY****Savita Gupta, Ph.D.***Faculty of Education, Lovely Professional University, Phagwara, Punjab (India)***Abstract**

Science is the most important subject and it helps to develop the problem solving, reasoning power, creativity of the students. 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 schools. 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. So investigator feel tempted to study the availability and usages of low cost no cost teaching material by elementary school teachers in pedagogy of science. The focus of this study is on use of low cost- no cost teaching material by the elementary school teachers in pedagogy of science.

Keywords: *Low cost- No cost teaching material, Science Pedagogy,*



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Introduction

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 pedagogy of science. This study is important to explore the use of low cost - no cost teaching material at elementary level.

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.

NPE (1992) the policy recommends as, “Every effort will be made to extend science education to the vast numbers who have remained outside the pace of formal education.”

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.

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 thermo Cole using scissors, glue etc. whereas senior school students could develop teaching aids using metal, wood, plastic, rubber etc.

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.

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 low but not always, lower than the imported equipment. 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 equipment illustrates 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 some time 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.

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 scares, 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.

Purposes, Objectives and Hypotheses

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.

The present study is designed to achieve the following 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 pedagogy of science
4. To study the behavioural change in students while studying with the help of Low Cost /No Cost Teaching Material in pedagogy of science in Elementary Schools.

1.1 Delimitation of the problem

The study was delimited to the elementary schools of Moga District of Punjab. Further it was delimited to the fifty elementary schools from rural and urban areas of Moga District

Method

Descriptive survey method was used to collect data regarding the use of low cost-no cost teaching material by elementary school teachers in pedagogy of science. The study was conducted on the government elementary schools in 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, 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. Simple random sampling technique was used to select the schools from the available list of elementary schools.

Procedure and Tool Used For Data Collection

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. From each school one science teacher was selected to collect information about the availability, involvement of students in preparation and use of low cost no cost teaching material while studying with the help of low cost- no cost teaching material. Self made check list was used for data collection. After the collection of data statistical techniques were used to analyze and interpret the data.

Data Analysis

The aim of the investigator was to study the LCNCTM, to explore the level of teacher's involvement in preparation of LCNCTM, to assess the usability of LCNCTM and to see the behavioural changes in students while studying with the help of LCNCTM .Sample size of 100 school teachers from 50 elementary schools were taken up randomly. Data was collected with the help of check list then investigator analyzed and interpreted the obtained data under following headings:

1. Availability of Low Cost -No Cost Teaching Material in Elementary Schools

Table 1. Availability of Low Cost-No Cost Teaching Material in Elementary Schools

| Item | Positive Responses | Negative Responses |
|---------------------------|---------------------------|---------------------------|
| Availability of LCNCTM | 53% | 47% |
| Readymade LCNCTM | 64% | 36% |
| Buy LCNCTM | 16% | 84% |
| Funds Provided for LCNCTM | 98% | 2% |
| Science Kits availability | 69% | 31% |
| Retaining Material LCNCTM | 42% | 58% |
| Raw Material availability | 56% | 44% |
| Improvisation of LCNCTM | 23% | 77% |
| Average | 53% | 47% |

* LCNCTM = Low cost - no cost teaching Material

Table1. Depicts that the 53% respondents said yes for availability of low cost - no cost teaching material on the other hand 47% respondents responded that there is non-availability of low cost/ no-cost teaching material for pedagogy of science in elementary schools. 64% respondents said yes for availability of readymade low cost - no cost teaching material for pedagogy of science in Elementary schools, on the other hand 36% respondents said no for the availability of readymade low cost - no cost teaching material for pedagogy of science in Elementary schools. In case of buying of low cost - no cost teaching material 16% responded yes for buying personally and 84% given no response for buying low cost - no cost teaching material personally. 98% responded for the availability of funds for arranging low cost - no cost teaching material, 2% respondents not agreed with the availability of funds for arranging low cost - no cost teaching material for pedagogy of science. In case of availability of science kits in elementary schools 69% teachers agreed and 31% teachers disagreed. 42% elementary schools science teachers retain the low cost - no cost teaching material, whereas 58% do not retain the low cost - no cost teaching material. In case of availability of raw material for preparation of low cost - no cost teaching material 56% respondents agreed and 44% were disagreed. 23% respondents improvise low cost - no cost teaching material and 77% respondents are not improvising low cost - no cost teaching material.

2. Involvement of teachers in preparation of Low Cost /No Cost Teaching Material in Elementary Schools

Table 2. Involvement of Teachers in Preparation of Low Cost /No Cost Teaching Material in Elementary Schools

| Item | Positive Response | Negative Response |
|--------------------------------------|--------------------------|--------------------------|
| Students Involvement | 32% | 68% |
| Time Spend for making of LCNCTM | 45% | 55% |
| Face problems in making LCNCTM | 87% | 13% |
| Attended Workshops for making LCNCTM | 62% | 38% |
| Extra Training for making LCNCTM | 23% | 77% |
| Satisfaction after making LCNCTM | 57% | 43% |
| Pupil Training in Making LCNCTM | 25% | 75% |
| Average | 47% | 53% |

Table 2 Shows that 32% teachers involve themselves in preparation of low cost - no cost teaching material 68% teachers do not take part in preparation of low cost - no cost teaching material. 45% teachers spend time on preparation of low cost - no cost teaching material, on the other hand 55% teachers do not spend enough time on preparation of low cost - no cost teaching material. 87% teachers faced problems while making low cost - no cost teaching material and 13% teachers don't face problems while making low cost - no cost teaching material. 62% teachers have attended the workshops for making low cost - no cost teaching material whereas 38% have not attended any workshop for making low cost - no cost teaching material. Regarding the training of low cost - no cost teaching material 23% teachers have got an extra training for making low cost - no cost teaching material, while the other 77% teachers have not got training for low cost - no cost teaching material. 57% teachers get satisfaction after preparation of low cost - no cost teaching material, whereas 43% teachers do not get satisfaction after preparation of low cost - no cost teaching material. 25% teachers involve pupils in preparation of low cost - no cost teaching material, whereas 75% teachers do not involve pupils in preparation of low cost - no cost teaching material.

Usability of Low Cost -No Cost Teaching Material in Elementary Schools

Table 3: Usability of Low Cost -No Cost Teaching Material in Elementary Schools

| Item | Positive Response | Negative Response |
|--------------------------------------|--------------------------|--------------------------|
| Helpful to handle class | 52% | 48% |
| Use for every Topic | 11% | 89% |
| Demand extra time to plan a lesson | 54% | 46% |
| Lessens the interest | 56% | 44% |
| Make teaching effective | 62% | 38% |
| More Clearance of the Concepts | 68% | 32% |
| Bring change in the Class room | 61% | 39% |
| Make friendly attitude with students | 53% | 47% |
| Time Saving | 25% | 75% |
| Average | 49% | 51% |

Table-3. Shows that 52% respondents think that low cost - no cost teaching material help to handle the large number of students, whereas 48% teachers do not think the same. Only 11% teacher have used low cost - no cost teaching material for every topic in pedagogy of sciences, on the other hand 89% teachers have not used low cost - no cost teaching material

for every topic in pedagogy of sciences. 54% teachers agreed that the use of low cost - no cost teaching material demands extra time to plan a lesson, whereas 46 % teachers disagreed. 56% teachers said that use of low cost - no cost teaching material lessen the interest of teachers in teaching process, whereas 44% teachers believed that the use of low cost - no cost teaching material lessen the interest of teachers in teaching process. Regarding the effectiveness of teaching through low cost - no cost teaching material 62% teachers believed that low cost - no cost teaching material make their teaching effective, whereas 38% teachers believed that low cost/no cost teaching material do not make their teaching effective. 68% teachers believed that use of low cost - no cost teaching material help the teachers to clear concepts, on the other hand 32% teachers believed that low cost - no cost teaching material do not help in clearing of concepts. 61% of teacher think that the use of low cost - no cost teaching material bring a change in the atmosphere of the class room, whereas 39% teachers think that there is no change in the atmosphere of the classroom. 53% teachers believed that use of low cost - no cost teaching material in science help in making the attitude of teacher very friendly with students on the other hand 47% teachers believed that use of low cost - no cost teaching material in science not helped in making the attitude of teacher friendly with students. 25% teachers are of the views that the use of low cost - no cost teaching material saves time which they utilized in other activities, whereas 75% teachers said that the use of low cost - no cost teaching material do not help in saving time for other activities.

Conclusions

The conclusions are the substance of an investigation and holds significant importance. The conclusions are presented under the following heads:

1. The availability of low cost no cost teaching material in elementary schools

- Fifty three percentage elementary schools have low cost - no cost teaching material for pedagogy of science in Elementary schools.
- Sixty four percentage elementary schools have readymade low cost - no cost teaching material for pedagogy of science in Elementary schools.
- Only sixteen percentage elementary schools buy low cost- no cost teaching material personally.
- Ninety eight percentage elementary schools have funds for arranging low cost- no cost teaching material.

- Sixty nine percentage elementary schools have low cost- no cost science kits.
- Forty two percentage elementary schools retain low cost- no cost teaching material.
- Fifty six percentage elementary schools have available raw material for preparation of low cost - no cost teaching material.
- Only twenty three percentage elementary schools improvise low cost - no cost teaching material.

It is found that there is less (53%) availability of low cost - no cost teaching material in elementary schools for pedagogy of science. To some extent there is availability of readymade teaching material, funds are sufficient even then a very few teachers buy low cost - no cost teaching material personally. Some schools has science kits. Availability of raw material for preparation of low cost - no cost teaching material in not satisfactory.

2. Involvement of teachers in preparation of low cost- no cost teaching material

- Thirty two percentage teachers involve themselves in preparation of low cost - no cost teaching material.
- Forty five percentage teachers spend time on preparation of low cost - no cost teaching material.
- Eighty seven percentage teachers faced problems while making low cost - no cost teaching material.
- Sixty two percentage teachers had attended the workshops for making low cost - no cost teaching material.
- Regarding the training of low cost - no cost teaching material 23% teachers had got the extra training for making low cost - no cost teaching material.
- Fifty seven percentage teachers get satisfaction after preparation of low cost - no cost teaching material.
- Twenty five percentage teachers involve pupils in preparation of low cost - no cost teaching material.

It was found that there is below average involvement of teachers in preparation of low cost - no cost teaching material in pedagogy of science. Involvement of students in preparation of low cost - no cost teaching material is very less, below average teachers spend time on preparation, there are so many problems in preparation, above average teachers have attended the workshops conducted by their respective department but few teachers had got extra training for preparation of low cost - no cost teaching material.

3. The use of low cost - no cost teaching material by elementary school teachers in pedagogy of science

- Fifty two percentage respondents think that low cost - no cost teaching material help to handle the large number of students.
- Only eleven percentage teachers have used low cost - no cost teaching material for every topic in pedagogy of sciences.
- Fifty four percentage teachers agreed that the use of low cost - no cost teaching material demands extra time to plan a lesson.
- Fifty six percentage teachers said that use of low cost - no cost teaching material lessens the interest of teachers in teaching process.
- Regarding the effectiveness of teaching through low cost - no cost teaching material 62% teachers believed that low cost - no cost teaching material make their teaching effective.
- Sixty eight percentage teachers believed that use of low cost - no cost teaching material help the teachers to clear concepts.
- Sixty one percentage teachers think that the use of low cost - no cost teaching material bring a change in the atmosphere of the class room.
- Fifty three percentage teachers believed that use of low cost - no cost teaching material in science help in making the attitude of teacher very friendly with students.
- Only twenty five percentage teachers are of the views that the use of low cost - no cost teaching material save time which they utilized in other activities.

It was concluded that there is below average usability of low cost - no cost teaching material in elementary schools in pedagogy of science. Low cost - no cost teaching material is not used for every topic by teachers, it demands extra time to plan a lesson and it is very time consuming.

Suggestions and Recommendations

Research has always some limitations this is especially in the case of research studies because at the time of data collection, any individual can try to conceal his negative aspects.

Suggestions

Research is never ending process. Every investigator after completing piece of research inevitably becomes aware of area in which further research is needed and naturally feels

motivated to indicate area, which may be taken up for research by other investigators. The following suggestions for further research could be undertaken:

1. This study may be conducted on secondary schools.
2. This study may be conducted on government and private schools.
3. Study should not be restricted in one district.
4. The study can be conducted at state level.

Recommendations

1. The present study recommends that the availability of low cost - no cost teaching material should be increased to enhance the learning in students.
2. There is need to increase the involvement of teachers in preparation of low cost - no cost teaching material. Involvement of students in preparation of low cost - no cost teaching material should be increased for the development of scientific attitude and skills.
3. The present studies indicate the less usability of low cost - no cost teaching material. There is a need to motivate the teachers for proper use of low cost no cost teaching material.
4. The study indicates that use of low cost - no cost material is very effective tool for behavioral change in learners which direct to more usability of low cost - no cost teaching material.
5. In our country where there is scarcity of funds there is need to prepare low cost-no cost teaching material kits.

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