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Relevancy and efficacy of science activities for class VIII students, district South-West Delhi

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Abstract

A well performed activity develops the ability to analysis, synthesis, evaluates and helps in achieving higher order cognitive, affective and psychomotor learning among students. It also provides opportunity to the students for developing and utilizing their experimental skills. The study was conducted on students of class VIII of DOE schools of district south west, Delhi during school experience programme. Specific activities were identified from standard VIII NCERT text book and their instructional objectives were identified. Tool was designed to check the appropriateness and effectiveness of these activities. Tool was consisting of eight indicators namely: able to follow the instructions, set up the apparatus, draw neat and labeled diagrams, conduct the activity and record the observations, make out inference, draw correct conclusions and apply the learning to real life situations. Qualitative and quantitative data was analyzed as per the objectives. The result of the study will facilitate the teacher in planning and implementing of new approach of learner based teaching.

Keywords: Relevancy, science, activities, DOE

Introduction

Regarding pupils at upper primary level, science and technology, NCF for science education, 2005 states children at this stage begin to recognize the relationship of science technology and human experience. The learner can be increased to improvise simple experiment and design experiments using local resources to understand scientific concepts and seek explanation of some of the natural phenomena. It is said that science is more of a verb than a noun. Purposeful learning takes place by blending uniquely content and process of science. Researchers have shown higher achievement in the structured mode of conducting activities. It is necessary to train the learner to observe whole into parts and parts into whole. Students can be trained in making interpretation, predictions and communication. Teachers can facilitate the learner not only in acquiring the knowledge but also in constructing the knowledge.

Objectives

1. To identify specific activities in class VIII science textbook.
2. To design tools to investigate the appropriateness and effectiveness of science activities.
3. To suggest extension of activities to enhance the students learning.

Hypothesis

1. Students come to the class with their minds engraved with a variety of preconceptions which may or may not be correct.
2. Activities performed or observed do not mean concept understood.
3. Their misconceptions and alternative framework need to be viewed by the teachers to enable them to see the phenomenon from student's perspective. It will facilitate the teacher in Planning and implementing of new approach to learning based teaching.

Questions to be answered by the undertaken study

1. Do the students observe the same things which are demonstrated by the various activities?
2. Do they get the same concept that the teacher wants them to or do they build up their knowledge?

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- What might be other approaches to the activities through which their pre-concepts may be challenged toward the attainment of right concept?

Research design and procedure

- Few activities were selected from VIII standard NCERT textbook and their instructional objectives were identified.
- Tools were designed to check the appropriateness and effectiveness of those activities.

Appropriateness and effectiveness tool consists of eight indicators namely:

Able to follow the instructions, set up the apparatus, draw neat and labeled diagrams, conduct the activity and record the observations, make out inference, draw correct conclusions and apply the learning to real life situations.

Appropriateness and effectiveness tool consists of eight items,

It is of 3 point rating scales

Above 75% of students: 3 point

40% - 70% of students: 2 point

Below 40% of students: 1 point

Activity will be considered as highly appropriate if total score > 17
Activity will be considered as appropriate if total score is between 9-17
Activity will be considered as not appropriate if total score < or equal to 8

- The investigator in real classroom situation performed ten activities distributed over different chapters of book.
- The sample comprised of VIII class students of DOE schools of district south west, Delhi of school experience programme.

- Activities were planned properly so as not to intervene in normal functioning of school.
- All the students were provided opportunity to observe and participate in the actual and have first-hand experiences of phenomenon.
- Proper instructions were given and on an average it took 20 minutes to carry out one activity and after this, education implication were discussed.
- The investigator recorded the following points for appropriateness and effectiveness during performance of activity.
 - Students were able to follow instructions.
 - Set up the Apparatus by students.
 - Draw neat and labeled diagrams.
 - Conducted the activity properly.
 - Observational record by students.
 - Make out inferences draw correct conclusion.
 - Applying learning to real life situation.

Analysis

Qualitative and quantitative analysis of data was done as per the objectives from the study sample schools.

Total 10 Activities were analyzed.

Activity 1: Friction

Objective

- To understand static friction.
- To find relationship between static frictional force with the nature of the surface of the object and floor.
- To find relationship between frictional force with the mass of the object.

Table 1: Assessment of appropriateness and effectiveness of the activity 1. Friction

Sr. No.	(% of Students) Indicators	Above (70%)3	40-70%2	Below 40%1
1.	Able to follow the instructions		2	
2.	Set up the apparatus	3		
3.	Draw neat and labeled diagrams		2	
4.	Conduct the activity		2	
5.	Record the observations			1
6.	Make out inferences		2	
7.	Draw correct conclusions			1
8.	Apply the learning to real life situations			1
	Total Score			14

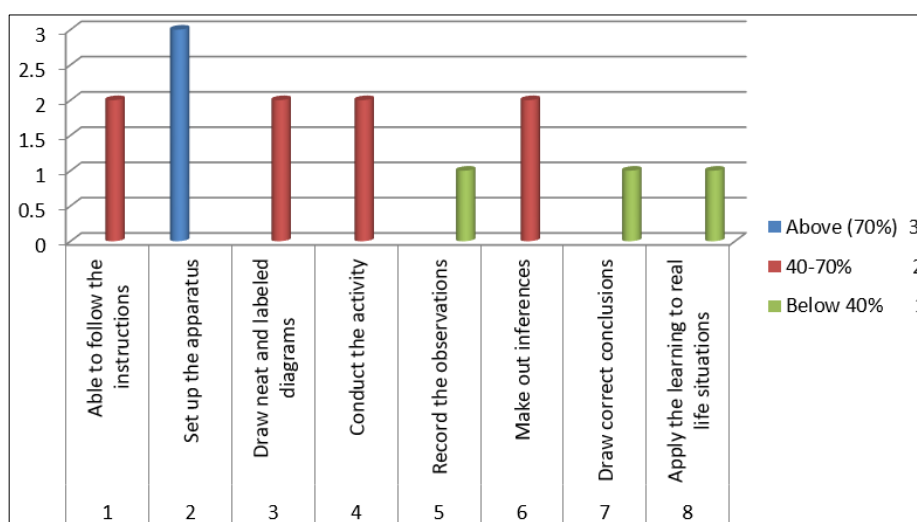


Fig 1: Graphical representation of score of students against indicators for activity 1. Friction

Total score of the friction activity is 14.

The 'friction activity' is appropriate and effective.

Extension of the activity

Repeat this activity when brick is broken down into two halves.

Keep one brick on half over the other so that total mass does not change but area of contact changes with the floor.

Does frictional force depend on the area of contact changes with the floor?

Activity 2: Force and Pressure

Objective

- To show that pressure of a liquid increases with depth.
- To find relation between density of a liquid with pressure exerted by liquids.
- To find the diameter of the vessel affects the pressure exerted by liquids.

This activity is slightly extended from the one given in NCERT book in the sense that student will be able to relate not only the pressure of liquid with depth but also the density of the liquid and diameter of the vessel.

Table 2: Assessment of appropriateness and effectiveness of the activity 2. Force and Pressure

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams			1
4.	Conduct the activity			1
5.	Record the observations		2	
6.	Make out inferences			1
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations			1
	Total Score			12

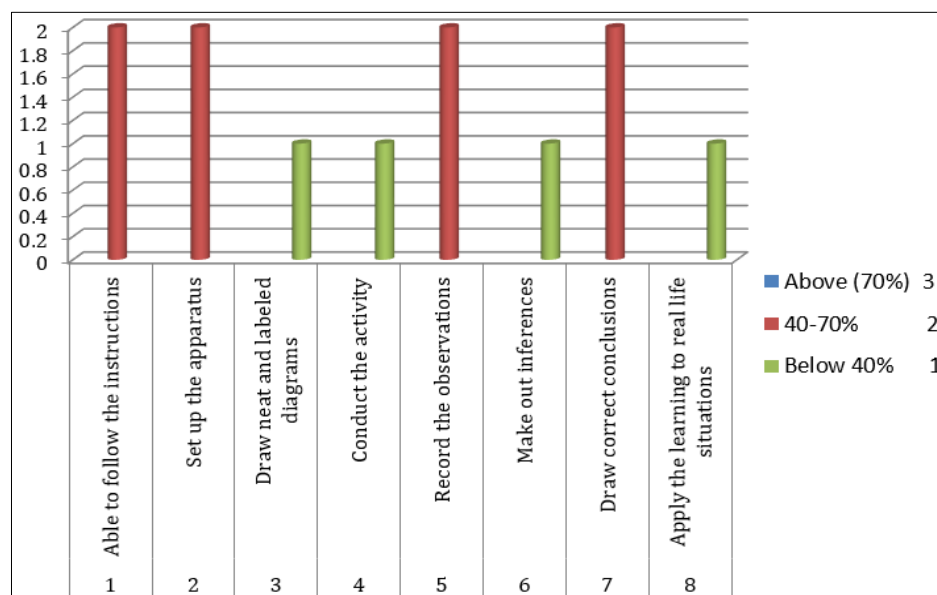


Fig 2: Graphical representation of score of students against indicators for activity 2. Force and Pressure

Total score of the force and pressure activity is 12.

The 'force and pressure' activity is appropriate and effective.

Extension of the activity: Repeat this activity with bottles of different diameters. Repeat again the same activity with

other liquids like milk, oil, sugar syrup etc.

Activity 3: Light

Objective

- To observe regular and diffused reflection.

Table 3: Assessment of appropriateness and effectiveness of the activity 3. Light

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams			1
4.	Conduct the activity			1
5.	Record the observations		2	
6.	Make out inferences			1
7.	Draw correct conclusions			1
8.	Apply the learning to real life situations			1
	Total Score			11

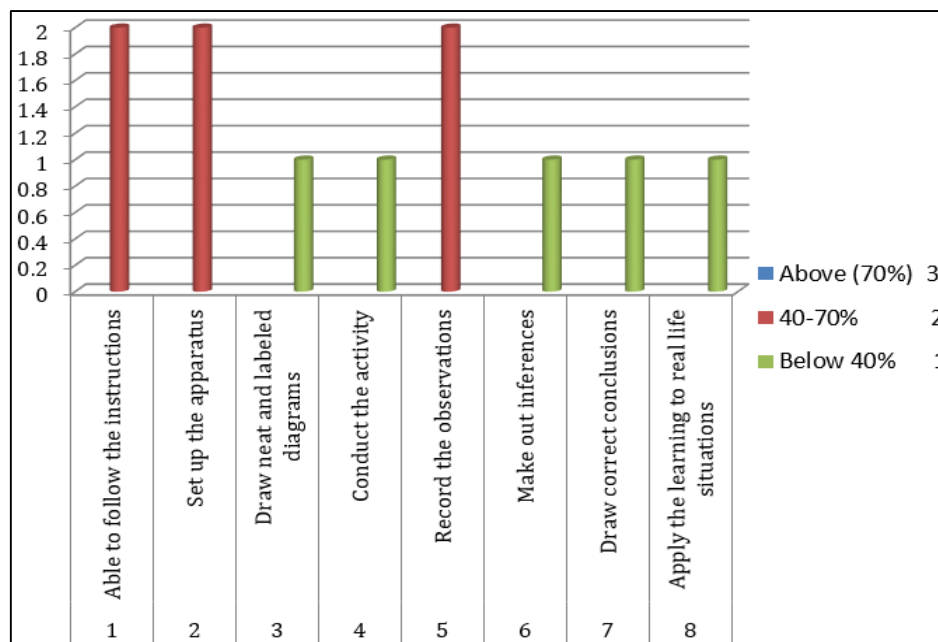


Fig 3: Graphical representation of score of students against indicator for activity 3. Light

3. Light

Total score of the light activity is 11 which reveal that the 'light' activity is appropriate and effective.

Extension of the activity

Repeat the activity on other shining surfaces that are smooth or rough.

Activity 4: Sound

Objective

To understand the relationship between lengths of the vibrating air column and frequency of sound.

Table 4: Assessment of appropriateness and effectiveness of the activity 4. Sound

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions	3		
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams		2	
4.	Conduct the activity		2	
5.	Record the observations		2	
6.	Make out inferences		2	
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations			1
	Total Score			16

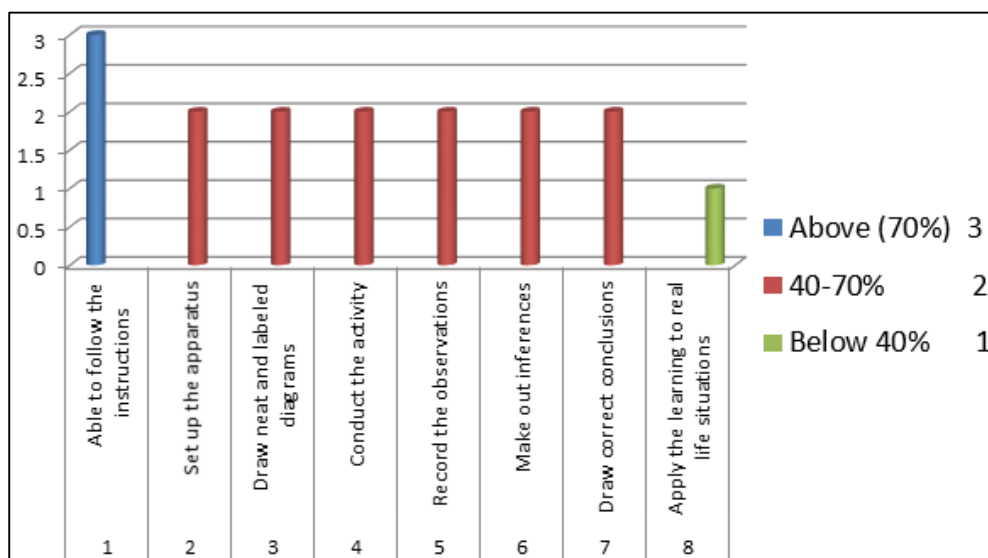


Fig 4: Graphical representation of score of students against indicator for activity 4. Sound

Total score of the sound activity is 11 which reveal that the 'sound' activity is appropriate and effective.

Extension of the activity: Repeat this activity with the help of rubber strip it beating air column.

Activity 5: Microorganism

Objective

To observe microorganism.

Table 5: Assessment of appropriateness and effectiveness of the activity 5. Microorganism

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus			1
3.	Draw neat and labeled diagrams			1
4.	Conduct the activity			1
5.	Record the observations			1
6.	Make out inferences			1
7.	Draw correct conclusions			1
8.	Apply the learning to real life situations			1
	Total Score			9

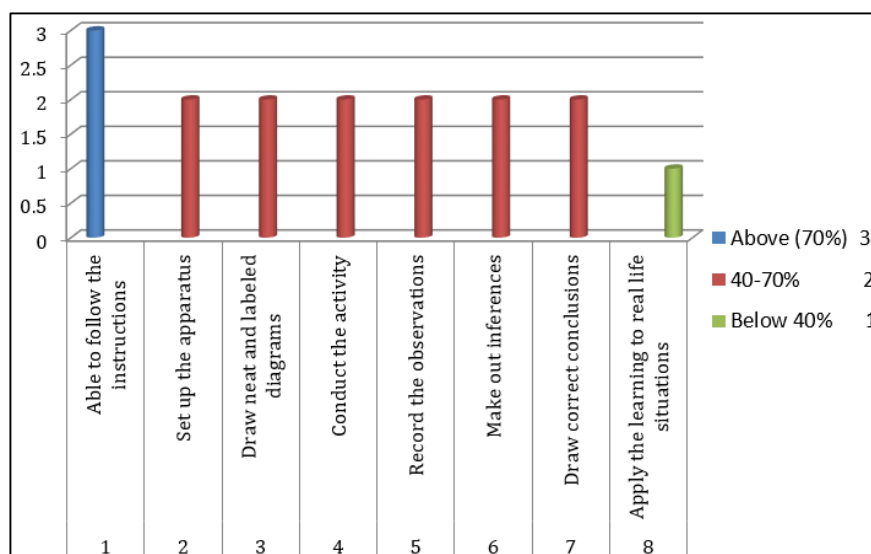


Fig 5: Graphical representation of score of students against indicators for activity 5. Microorganism

Total score of the microorganism activity is 9 which reveal that the microorganism activity is appropriate and effective.

Extension of the activity: Scrap your teeth with a toothpick and observe the scraping under a microscope.

Activity 6: Amoeba and Paramecium

Objective

To show permanent slides of amoeba and paramecium.

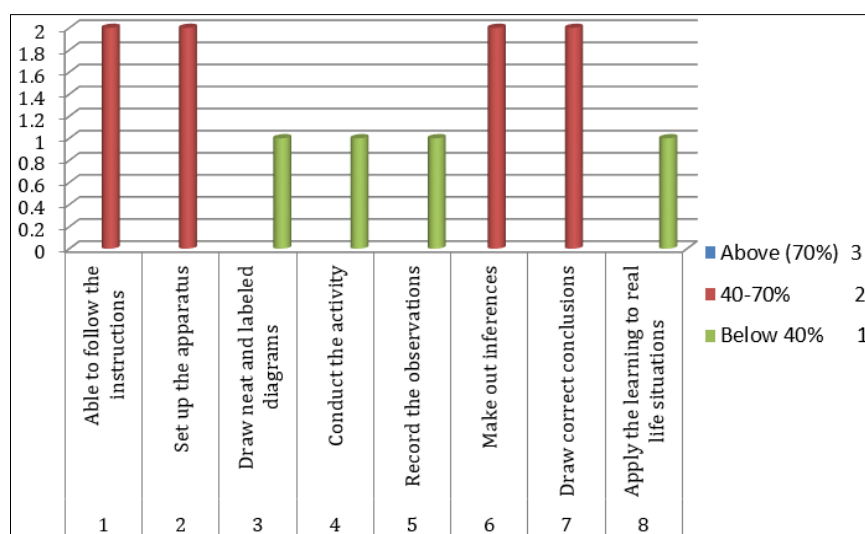


Fig 6: Graphical representation of score of students against indicators for activity 6. Amoeba and Paramecium

Table 6: Assessment of appropriateness and effectiveness of the activity 6. Amoeba and Paramecium

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams			1
4.	Conduct the activity			1
5.	Record the observations			1
6.	Make out inferences		2	
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations			1
	Total Score			12

Total score of the permanent slides of amoeba and paramecium activity is 12 which reveal that the permanent a slide of amoeba and paramecium activity is appropriate and effective.

Extension of the activity: Repeat the activity with the help

of curd to make a slide and show lactobacillus.

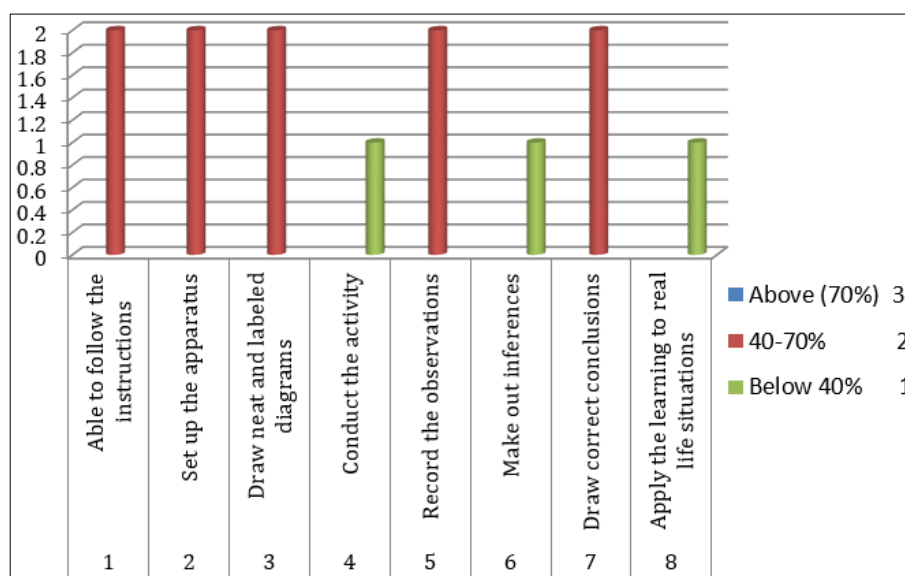
Activity 7: Fermentation

Objective

To study the fermentation process by using yeast.

Table 7: Assessment of appropriateness and effectiveness of the activity 7. Fermentation

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams		2	
4.	Conduct the activity			1
5.	Record the observations		2	
6.	Make out inferences			1
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations			1
	Total Score			13

**Fig 7:** Graphical representation of score of students against indicators for activity 7. Fermentation

Total score of the fermentation process by using yeast is 13 which reveal that the fermentation process by using yeast activity is appropriate and effective.

Extension of the activity: Repeat this activity with crushed grapes and yeast in the tube and fit a little inflated balloon

over it.

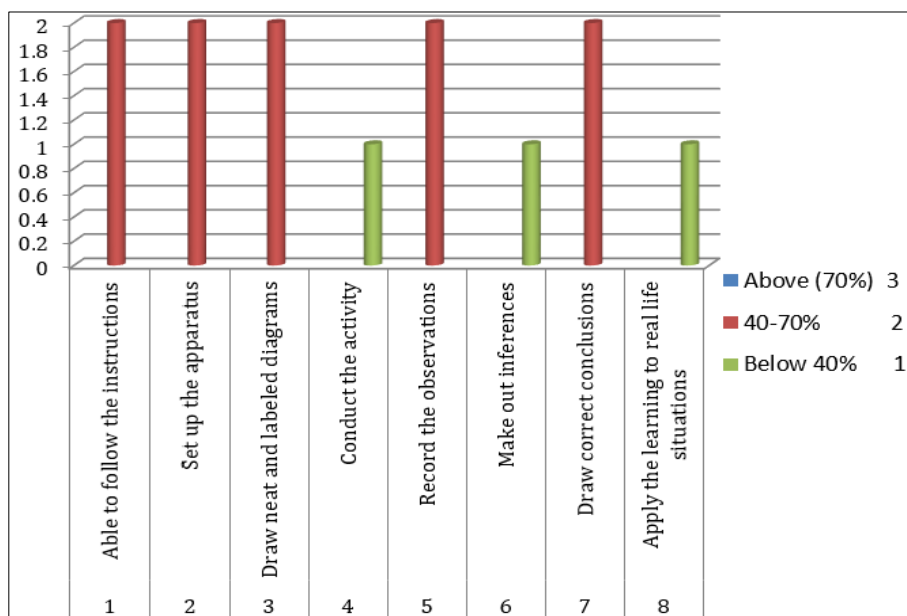
Activity 8: Combustion

Objective

To show that air is necessary for combustion.

Table 8: Assessment of appropriateness and effectiveness of the activity 8. Combustion

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams		2	
4.	Conduct the activity			1
5.	Record the observations		2	
6.	Make out inferences			1
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations			1
	Total Score		13	

**Fig 8:** Graphical representation of score of students against indicators for activity 8. Combustion

Total score of air is necessary for combustion activity is 13 which reveal that the activity is appropriate and effective.

Extension of the activity

To make it more effective and self-explanatory repeat the same activity in a plate with some coloured water at the base in all three cases. Does the level of the water rise in any of the chimney. Why the level of the water rises up in the third

case.

Activity 9: Heat

Objective

To show the conduction of heat process.

- To know about the ignition temperature of substance.
- To know about the conduction of heat.

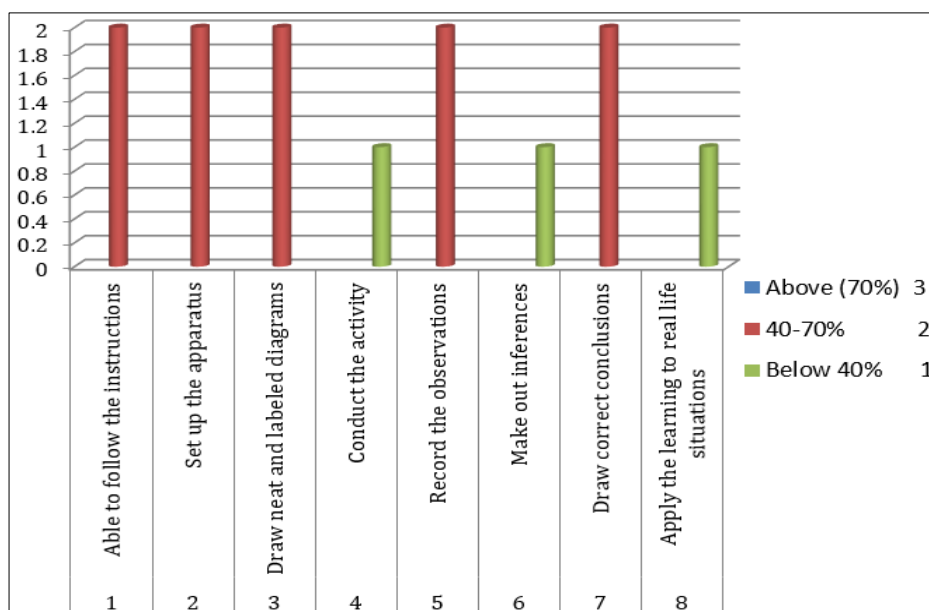
**Fig 9:** Graphical representation of score of students against indicators for activity 9. Heat

Table 9: Assessment of appropriateness and effectiveness of the activity 9. Heat

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions	3		
2.	Set up the apparatus	3		
3.	Draw neat and labeled diagrams	3		
4.	Conduct the activity			
5.	Record the observations		2	
6.	Make out inferences		2	
7.	Draw correct conclusions		2	
8.	Apply the learning to real life situations		2	
	Total Score		19	

Total score of the conduction of heat process is 19 which reveal that the conduction of heat process activity is appropriate and effective.

Extension of the activity: Repeat this activity by use of any other liquid instead of water.

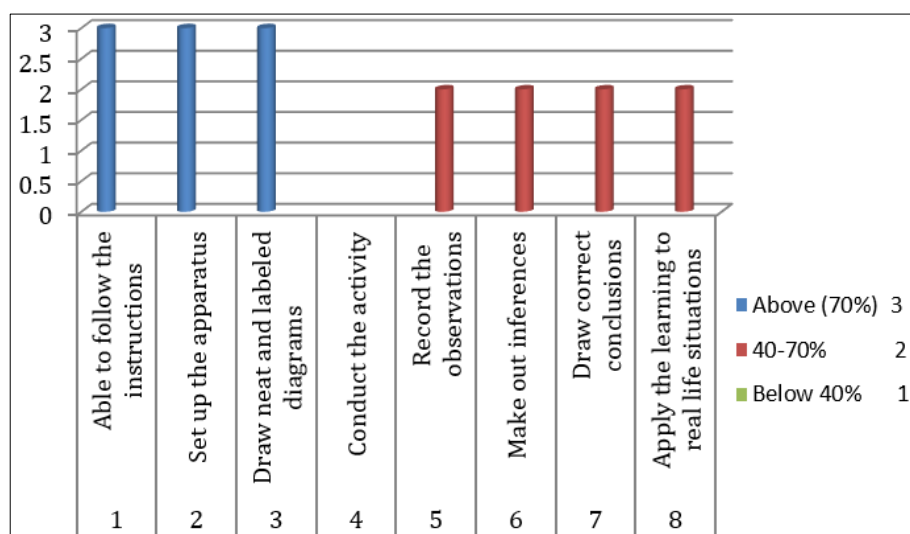
Activity 10: Electroscope

Objective

To design a simple electroscope.

Table 10: Assessment of appropriateness and effectiveness of the activity 10. Electroscope

Sr. No.	(% of Students) Indicators	Above (70%) 3	40-70% 2	Below 40% 1
1.	Able to follow the instructions		2	
2.	Set up the apparatus		2	
3.	Draw neat and labeled diagrams		2	
4.	Conduct the activity		2	
5.	Record the observations			1
6.	Make out inferences			1
7.	Draw correct conclusions			1
8.	Apply the learning to real life situations			1
	Total Score			12

**Fig 10:** Graphical representation of score of students against indicators for activity 10. Electroscope

Total score of the simple electroscope is 12 which state that the simple electroscope activity is appropriate and effective.

Extension of the activity: Take a plastic comb/ inflated balloon/ball point pen refill and change these items by method of friction.

Findings of the study: After checking the activities from the textbook, it was found that most of them provided a rich and significant learning experience to students but few of them needed redesigning in terms of their workability and effectiveness. Outcome of the study was substantiated and their modified approach was suggested.

Educational implication

Results and findings of this study will help the teachers to incorporate activities effectively in teaching learning process in such manner that the contents and process skills of science are developed simultaneously towards the attainment of desired instructional objectives. Also by pondering over the misconceptions of pupils, strategies and tactics of planning and executing the activities would emerge out. It will also help the teacher educator to impart training to pre service teacher. It is expected that findings of the study would add an important dimension to the research avenues pertaining to teaching of science at the upper primary level.

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