

**Enhancing the Conceptual understanding of Lever
Mechanism by considering its Mechanism
Instead of mere Instrument**



Action Research Report Submitted to

**STATE COUNCIL OF EDUCATIONAL RESEARCH AND
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by

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DECLARATION

I declare that, this action research entitled, **“Enhancing the Conceptual understanding of Lever Mechanism by considering its Mechanism Instead of mere Instrument”**, submitted to Directorate of State Council of Educational Research and Training, by me is an original and independent research work and this work has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other similar title.

Place: Munanjipatti

C.Srinivasan

Date:

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C Srinivasan

CONTENTS

SL.NO	TOPIC	PAGE
1	BACKGROUND OF THE STUDY	1
2	PERCEPTION OF THE PROBLEM	2
3	ANALYSATION OF THE PROBLEM	3
4	PROPOSITIONS	4
5	ACTION HYPOTHESIS	5
6	INTERVENTION PLANNED	6
7	EXECUTION OF INTERVENTION	7
8	TERMINATION	15

1. BACKGROUND OF THE STUDY

The researcher is working as Lecturer in District Institute of Education and Training, Munanjipatti, Tirunelveli District, Tamilnadu State. DIET (District Institute of Education and Training) is the academic authority of elementary school education. DIET gives In-service trainings to elementary school teachers, guide them to do action researches, guide to prepare innovative TLM and guide to use information technology in teaching and learning process. Thus, DIET acts important role in elementary school education. The researcher has done many action researches along with the practicing school teachers. In this way this is one more.

In the routine school visits, the researcher found that, the students tell examples the calcification of lever mechanism and give examples for them. They associate particular example with particular type of lever. They didn't relate the functional style of particular simple machine with its lever calcification. Actually, the lever calcification is made on the functional style of the particular simple machine. So, the researcher decided to attempt the problem in his action research.

2. PERCEPTION OF THE PROBLEM

Most of the students know the name of three classes of lever. Because it has not any special name, named as Class I lever, Class II lever and Class III lever. There are three positions in a simple machine, those are Force, Load and Fulcrum. These are not the three parts of a simple machine. It refers where the force acts, where the load is loaded and where the fulcrum is placed when the simple machine is functioning. All these are depending on the operational style of a simple machine. These are not fixed ones, these can be altered on its working style. But the common perception is that, these are all fixed ones and could not be changed.

3. ANALYSATION OF THE PROBLEM

In this action research, we take traditional example of a particular class of lever mechanism. We operate the simple machine in traditional way and explain that how it comes under particular traditional class of lever.

We take a simple for simple machine which was classified under class I lever. We operate it traditionally and we explain that how it is classified under class I lever. Now we operate the same simple machine with a different style and we explain that how it can be classified under class II lever or class III lever or both. We do the same for all three classes of lever. We argue that the classification of lever mechanism is depends on its operational style and not to be taken as told traditionally which mere fix the class on its name.

4. PROPOSITIONS

Here the researcher proposes only one proposition to classify the class of lever.
That is, Determine the class of lever only on its operational style not by its name.

5. ACTION HYPOTHESIS

Studying the classification of lever mechanism by studying the style of operation of simple machine enhances the conceptual understanding of lever mechanism of Standard IV Students.

6. INTERVENTIONS PLANNED

The researcher has planned to give the following interventions.

- Introducing, what is force, load and fulcrum in a simple machine
- Differentiating the force and load
- Introducing the role of fulcrum in the function of a simple machine
- Introducing the point of force, load and fulcrum in a simple machine
- Introducing the examples for the all three classes of lever mechanism as given in the book and giving demonstration by its traditional way of style of operation of a simple machine
- Giving different operational style to a simple machine which depends on individual which leads to different class of lever which different from its traditional class of lever
- Giving different operational style to a simple machine which depends on nature of the work which leads to different class of lever which different from its traditional class of lever
- Concluding that, particular class of lever mechanism is to be determined on its operational style not by its name

7. EXECUTION OF INTERVENTIONS

At first, we have to understand that what is Force, Load and Fulcrum.

Force, Load and Fulcrum

The force applied on a simple machine to do some work is called force. This is applied on a machine to do some mechanical work. Sometimes it is difficult distinguish force from load. For example, in an ordinary balance, to weigh tomato, we put tomatoes in the right-side pan and weighing stone in the left side pan. Here the weighing stones act as force. Here both tomato and weighing stones are solid things.

The load is the material, in which the force is applied. Sometimes force is applied directly on the load, some other time, it may be applied indirectly, that is, the force is transferred from the point of action to the load. The force transformation take place by the simple machine. We have to take the point of force as the position of force.

The function of the simple machine is about a point and which would not move anywhere and no function without that point. That is called fulcrum.

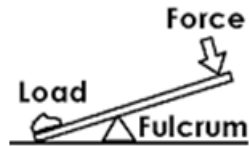
Classes of Lever of a Simple Machine

The point where the force act is called, point of force, as well as, the point where the load act is called, point of load, and the point where the fulcrum act is called, point of fulcrum. So, there are three points. Depending on that, which point is in between the other two points, we classify the lever of a simple machine in three classes of lever, those are,

1. Class I lever
2. Class II lever
3. Class III lever

1. Class I lever

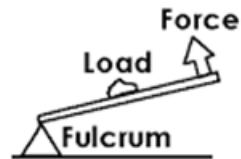
Here the point of fulcrum is in between, point of force and point of load



Class-1

2. Class II lever

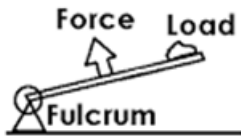
Here the point of load is in between, point of fulcrum and point of force



Class- 2

3. Class III lever

Here the point of force is in between, point of fulcrum and point of load



Class- 3

Traditional Examples for three Kinds of lever

1. Class I lever

- a. Pliers b. Scissors c. Crowbar d. Claw Hammer e. See-Saw
- f. Weighing Balance g. Tongs h. Nail Clippers

2. Class II lever

- a. Wheelbarrow b. Staplers c. Doors d. Bottle Openers
e. Nutcracker f. Wedge g. Shovel h. Diving Board

3. Class III lever

- a. Fishing Rod b. Broom c. Baseball Bat d. Human Jaw
e. Bow and Arrow f. Elbows g. Woomera h. tweezers

Already we have said that the purpose of work of a simple machine changes the class of its lever.

Purpose of work of a simple machine changes the class of its lever

Take the function of a Crowbar. See the two pictures. The force is acting one end and in downward direction. The load is in another end and it is lifted in upward direction. It is clear that the force and load are acting in the two ends of the Crowbar. In between the point of force and load, there a wooden rod. The Crowbar works about the wooden rod. This act as fulcrum. Here the force and load move in some directions. But the fulcrum never moves. Here the purpose of the simple machine is lifting the load and not moving the load.



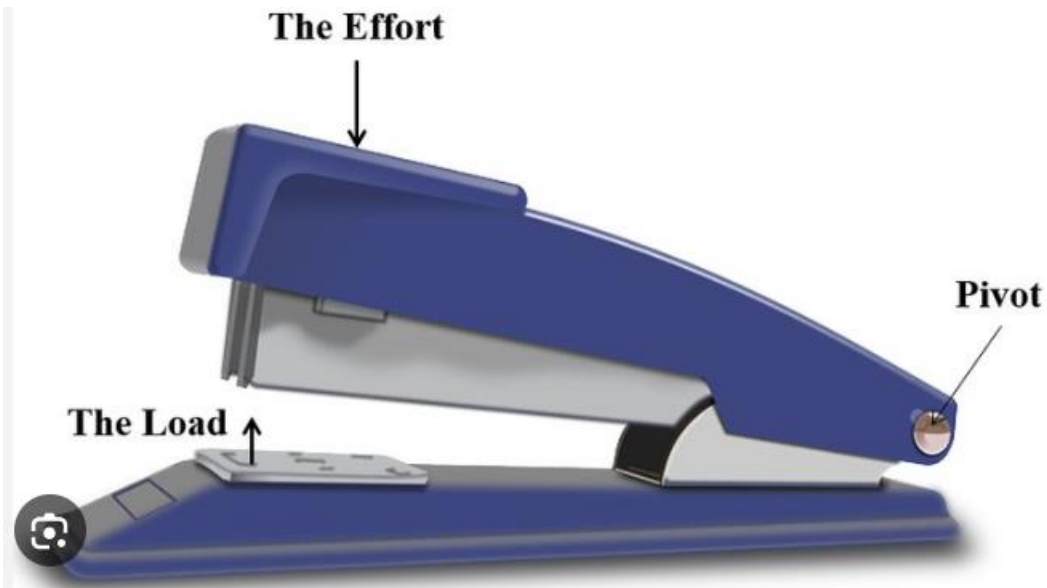


Let us imagine that, the wooden rod which acts as fulcrum has been removed now. The Crowbar is moved upward direction with the same position given the above picture. What will happen? Now the “load” is lifted and moved. Here the purpose of the simple machine is, moving the “load” in one direction and not lifting. But lifting that is necessary to move it. Here, where is fulcrum? There is no change in the point of force. The Crowbar acts about the ground which is at the sharp edge of the Crowbar. The load becomes in between the force and the load. Then, which lever class is this? Load is in between force and fulcrum. So, it is Class II lever. We say that, a Crowbar can act as both Class I lever and Class II lever. The purpose of a simple machine changes the operational procedure which lead the class of lever. To understand this, see the picture. Here the man uses a small size Crowbar. Using a Crowbar, the man removing the pasted tile. Here the load is in between force and fulcrum. So, it should be classified under class II lever. But in common we classify Crowbar as class I lever. The lever classification should be decided on the working style of the particular simple machine not by its name.



Style of Operation of a simple machine changes the class of its lever

Already we have said that the style of operation causes the change of lever class. Now we are going to give an example that, how the style of operation of a simple machine changes its class of lever. See the following two pictures.



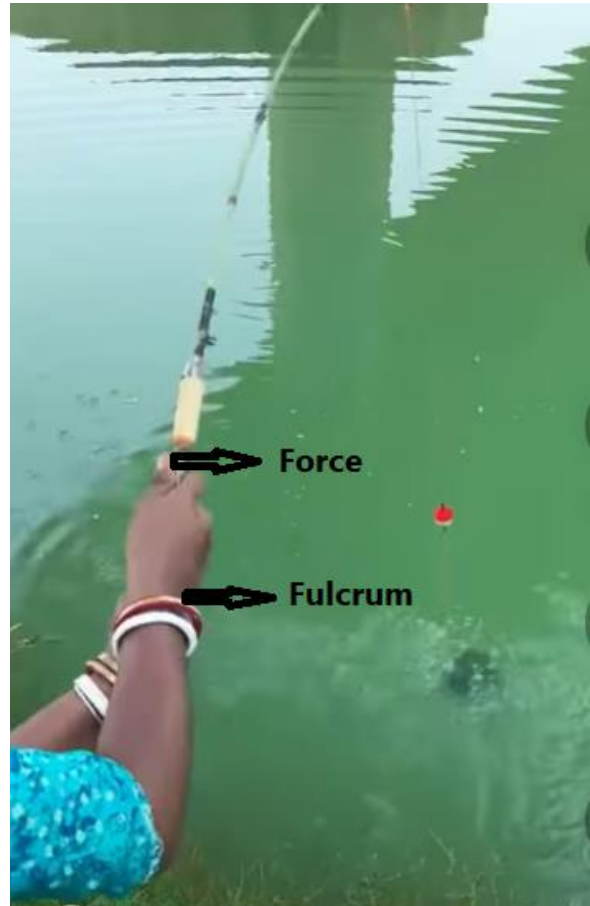


People can operate a Stapler in both way which are shown in the above two pictures. Here the style of operation differs. If one operates like the first picture, it comes under class III lever. Here the force or effort is in between fulcrum and load. If you operate the same stapler like as the second picture, it comes under class II lever. Here the load is in between fulcrum and force. So, here the style of operation of a simple machine changes the class of lever.

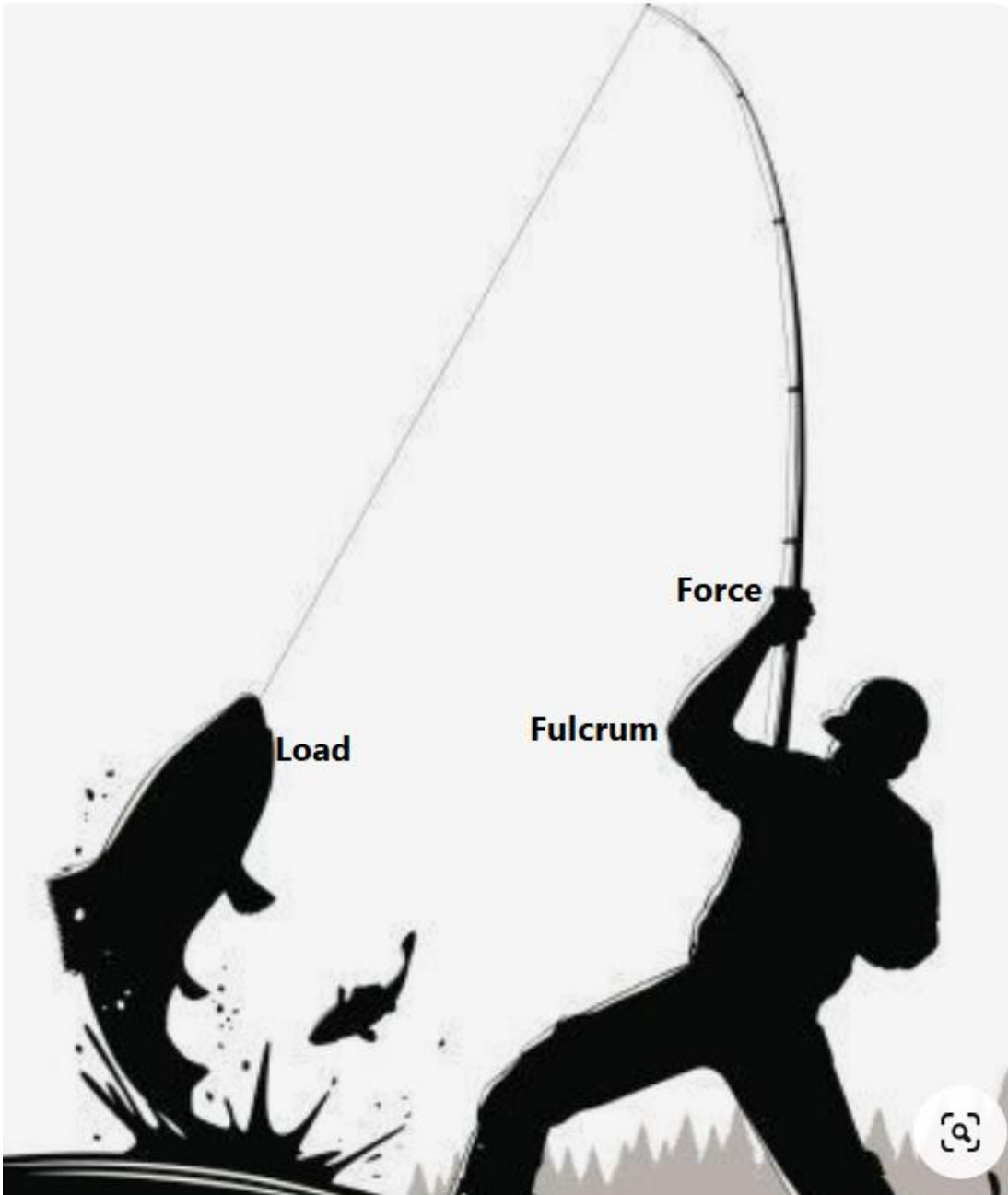
We conclude that, the lever classification should be decided on the style of operation of individual on the particular simple machine, not by its name.

Whether Fishing bait to be classified under class I or class II lever

Some people classify the Fishing bait under class I lever. They tell that fish is load, force is given by our hand and thread joint with the stick is fulcrum. It is not correct. In a simple machine functioning, the fulcrum should not move. Let us imagine, fishing with fishing bait. Is the point where thread join with the stick moves or not? It moves certainly. So, it can't be fulcrum. When fishing, the Wrist or Elbow or both act as fulcrum.



We should not treat mere fishing bait as whole simple machine. When it is operated, some other external things may be needed to operate it. Here the wrist or elbow or both involve in the fishing process. The fishing bait works about the wrist or elbow or both. Obviously, the fish is the load. The front part of the hand supplies the force. So, the effort is in between the load and fulcrum. So, it is class III lever.



TERMINATION

The conceptual understanding of lever mechanism of standard IV students increase, when we consider the mechanism of lever, instead of mere name of the Instrument.

The research accepts the Hypothesis