

# **ACTION RESEARCH**

**ENRICHMENT OF STANDARD VI STUDENTS IN UNDERSTANDING  
SKELETAL AND MUSCULAR SYSTEM WITH INTERRELATIONSHIP  
THROUGH SKEMUS**



**Submitted to**

**The Director  
State Council of Educational Research and Training  
Chennai- 6**

**By**

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Tirunelveli  
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## **ACKNOWLEDGEMENT**

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I extend my sincere gratitude to the Director, SCERT, my Principal Dr.P.Golda Grena Rajathi and my colleagues for their valuable suggestions and guidance during the tenure of my research.

I also acknowledge with a deep sense of reverence, my gratitude towards my parents and my husband and my two sons for their moral support given to me in completing the project.

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### **DECLARATION**

I hereby declare this action research entitled **“Enrichment of Standard VI Students in Understanding Skeletal and Muscular System with Interrelationship through SKEMUS”** is a record of research work done by me at District Institute of Education and Training, Munanjipatti, Tirunelveli District to submit to the State Council of Educational Research and Training, Chennai. I also declare that this work has not been submitted either in full or part by any other researcher at any Institution.

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**Signature of the Researcher**

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## **CERTIFICATE**

This is to certify that V. RUBYSELVARANI, Lecturer in DIET, Munanjipatti has successfully completed the Action Research on the **Topic “Enrichment of Standard VI Students in Understanding Skeletal and Muscular System with Interrelationship through SKEMUS” during** the Academic year 2023 - 2024.

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**PRINCIPAL**

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## **1. BACKGROUND OF THE STUDY**

The action researcher is working as a lecturer in the PSTE branch of District Institute of Education and Training, Munanjipatti, Tirunelveli District.

Action research stands as unique approach in the realm of qualitative inquiry in social science research. Rooted in real-world problems, it seeks not just to understand but also to act, bringing about positive change in specific contexts. Often distinguished by its collaborative nature, the action research process goes beyond traditional research paradigms by emphasizing the involvement of those being studied in resolving social conflicts and effecting positive change.

Action research is a process that is commonly used by educational practitioners and professionals to examine, and ultimately improve, their pedagogy and practice. In this way action research represents an extension of the reflection and critical self-reflection that an educator employs on a daily basis in their classroom. When students are actively engaged in learning, the classroom can be dynamic and uncertain, demanding the constant attention of the educator. Considering these demands, educators are often only able to engage in reflection that is fleeting, and for the purpose of accommodation, modification, or formative assessment. Action research offers one path to more deliberate, substantial, and critical reflection that can be documented and analyzed to improve an educators' practice.

The value of action research lies not just in its outcomes, but also in the process itself, where stakeholders become active participants rather than mere subjects. As one of many approaches to educational research, it is important to distinguish the potential purposes of action research in the classroom. It is method to enable and support educators in pursuing effective pedagogical practices by transforming the quality to teaching decisions and

actions, to subsequently enhance student engagement and learning. Being mindful of this purpose, the following aspects of action research are important to consider the contemplate and engage with action research methodology in our classroom.

- Action research is a process improving educational practice. Its methods involve action, evaluation, and reflection. It is a process to gather evidence to implement change in practices.
- Action research is participative and collaborative. It is undertaken by individuals with a common purpose.
- Action research is situation and context-based.
- Action research develops reflection practices based on the interpretations made by participants.
- Knowledge is created through action and application.
- Action research can be based in problem solving if the solution to the problem results in the improvement practice.
- Action research is iterative; plans are created, implemented, revised, then implemented lending itself to an ongoing process of reflection and revision. In action research findings emerge as action develops and takes place; however, they are not conclusive or absolute, but ongoing.

It is thinking about the purpose of action research, it is helpful to situate action research as a distinct paradigm of educational research.

## **2. PERCEPTION OF THE PROBLEM**

With the right perception of any problem we can always come up with the right solution because right problems will carry the solution with them. There are different types of perceptions, major types include vision, touch, auditory, olfactory, taste and proprioception. These work together to provide enough information for an individual to respond to their surroundings.

Action research is a method of finding out what works best in a own classroom so that teacher can improve student learning. There are many ways to improve knowledge about teaching. Many teachers practice personal reflection on teaching, others conduct formal empirical studies on teaching and learning. Action research generates knowledge around inquiry in practical educational contexts. Action research allows educators to learn through their actions with the purpose of developing personally or professionally. Due to its participatory nature, the process of action research is also distinct in educational research there are many models for how the action research process takes shape.

- Plan a change
- Take action to enact the change
- Observe the process and consequences of the change
- Reflect on the process and consequences
- Act, observe & reflect again and so on.



**Basic action research model**



**Action research spiral – Kemmis and Mc Taggart**

The students of standard VI were having the problem in understanding the concept of skeletal and muscular system

The investigator at the time of visit for the observation and found out the difficulty of understanding of human organ system particularly skeletal and muscular system among standard VI students. Because the two organ system they combined together and form musculoskeletal system. The students might get confusion in identifying whether this part comes under skeletal system or muscular system. So it is important to know and learn human organ system and it makes the students to understand the system and how they works. So, it shows that understanding the human organ system is important for the students and to improve the understanding the concept the investigator selected the topic to take away the students to a better level. The method the investigator chosen was SKEMUS. This method was taken from the concept itself i.e., skeletal and muscular system. The first three letters of each word were taken and combined together to form a method SKEMUS. It uses different intervention to enhance the understanding the above concept.

### **3. ANALYSIS OF THE PROBLEM**

The investigator visited the students studying in standard VI in Quaide Milleth Government Higher secondary school, Melapalayam and observed that they have the difficulty in understanding the skeletal and muscular system of human organ system. The investigator found out the difficulty in understanding the skeletal and muscular system of human organ system. The human body is a biological machine made of body systems. It is made up of cells that combine to form tissues, tissues altogether form organs which further group together to form organ systems. Our human body consists of 11 organ system that are skeletal system, muscular system, nervous system, endocrine system, cardiovascular system, integumentary system, lymphatic system, respiratory system, digestive system, urinary system and reproductive system and these organ systems work together to produce and sustain life. These specialized systems allow for complex functions to be carried out to maintain life, such as gas exchange, nutrient absorption and distribution and more. It is also useful to explore what internal organs look like and where they are located and the role we play in the natural world and in order to understand the specific function of each and how each contributes to keeping the body alive and well. For example the respiratory system and the circulatory system work closely together to deliver oxygen to the cells and to get rid of the carbon dioxide the cells produce. Like wise bones, muscles and joints make up the musculoskeletal system, along with cartilage, tendons and ligaments. This system gives your body its structure and support. The bones of the skeletal system serve to protect the body's organs, support the weight of the body and give the body shape. The muscles of the muscular system attach to these bones, pulling on them to allow for movement of the body. So it is important to know how the organ system functions. It makes humans aware their organ systems and they can maintain their health. By knowing the system and their functions to maintain homeostasis or a balance in the

body. Bones, muscles and joints make up the musculoskeletal system, along with cartilage, tendons and ligaments. This system gives your body its structure and support, lets you move around and protects important organs. Injuries and many illnesses can damage bones, muscles and joints. The bones of the skeletal system serve to protect the body's organs, support the weight of the body, and give the body shape. The muscles of the muscular system attach to these bones, pulling on them to allow for movement of the body. So the students should know the importance and how they work together and how they differentiate from one another. So this problem is selected for this study.

## **4. PROBABLE CAUSES**

Among various reasons, the researcher has made out the following as the probable causes for the problem under study.

It may be due to

➤ **Lack of contextualization**

One of the most common reasons why we struggle to apply concepts we learn is that the learning material is not contextualized enough. This means that the concepts are presented in a vacuum, without any examples or connections to real-world situations

➤ **Overreliance on knowing by heart**

When we learn through knowing by heart rather than true understanding, we are able to successfully recall the information when needed but may not necessarily be able to apply it in real-life situations. This approach can also hinder our efforts towards an in-depth understanding of a concept by creating the belief that we know how to go about it, when in reality we only know the information.

➤ **Limited exposure**

Sometimes, we simply do not have enough exposure to real-life situations in which the students can apply what they learn. This can be particularly true for academic subjects, where the focus is often on theory rather than practice. The students should practice imagination and give a little hypothetical puzzle to solve. And there are some other causes that lead to inability to understand the concepts. They are:

- Lack of exposure to other resources other than the traditional method in learning science concepts

- Lack of motivation in learning science concepts with regard to skeletal and muscular system
- Lack of multisensory approach
- Direct experience may not given
- Lack of interest to know the skeletal and muscular system

This is not an exhaustive list of causes and these are causes presumed by the researcher that may contribute to the problem in their own way.

## **5. DEVELOPMENT OF PROPOSITIONS**

While there are many reasons why the students struggle to understand and apply the concepts they study, there are many ways to overcome these barriers:

- One of the most effective strategies is to seek out opportunities to practice and apply what we learn, to real-world situations. By doing so, the students can question what they know and develop deeper understanding of the concepts to then build confidence in their ability to execute them effectively.
- Another approach is how the students intend to apply the concept they are about to learn. It will help the students to consume the incoming information.
- Applying concepts to real life is a process that takes time, practice, and patience.

The following approaches are proposed in order to overcome the probable causes mentioned above:

- The teacher shall implement creative and innovative teaching strategies in order to meet students' individual needs
- Effective teaching strategies can use to inspire classroom practice
- Using of interactive classroom methodology by displaying photos, audio clips, videos also will provide learning environment
- Pose thought-provoking questions may inspire students to think for themselves and become more independent learners
- Assigning classroom activities through skill, understanding, knowledge according to students unique learning needs would provide higher academic capabilities.

- Incorporating technology into teaching is a great way to explain the classification of plants and actively engage students, especially digital media surrounds the younger generation students.
- Classify the materials surrounded by them and available plant materials might show to them for direct experience.
- Procedural format of understanding will give an idea on the human organ system. Identification of the parts of the human organ system also will develop the knowledge of human organ systems skeletal and muscular system.

## **6. ACTION HYPOTHESIS**

The difficulty of understanding the skeletal and muscular system among standard VI students will enhance through the method SKEMUS.

## **7. PLANNING FOR INTERVENTION**

The changes resulting from application of an intervention are called effects, and if they relate to the goals and objectives for which the intervention was designed, these results are called outcomes. Effects and outcomes are not necessarily the same.

Intervention in action research refers to the implementation of strategies or measures aimed at bringing about change or improvement in a specific context or situation. It involves actively engaging with the participants or stakeholders in the research process to address the identified issues or challenges.

The main aim of an intervention is to remove or ameliorate those forces and factors which appear to be hindering or threatening development. To introduce and promote those forces and factors which appear to be aiding development.

Once a problem has been identified as needing intervention, the process of designing an intervention can be broken down into six crucial steps:

1. Defining and understanding the problem and its causes
2. Identifying which causal or contextual factors are modifiable; which have the greatest scope for change and who would benefit most
3. Deciding on the mechanisms of change
4. Clarifying how these will be delivered
5. Testing and adapting the intervention and
6. Collecting sufficient evidence of effectiveness to proceed to a rigorous evaluation

Intervention in action research refer to the planned actions or strategies implemented to address a specific issue or problem. These aim to bring about positive change and improvement in a particular context or setting.

Borgia and Schuler describe the components of action research as ‘Five Cs’: commitment, collaboration, concern, consideration and change.

Intervention in action research refers to the implementation of strategies or measures aimed at bringing about change or improvement in a specific context or situation. It involves actively engaging with the participants or stakeholders in the research process to address the identified issues or challenges. The interventions are typically based on the findings and insights gained from the research and are designed to have a lasting and integrated impact. In the context of the papers provided, intervention in action research is seen in various areas such as supporting coping and resilience in school and community settings, improving the care of refugee people through integrated interventions in primary services, designing and implementing a plan to improve sleep for oncohaematological patients, and changing language beliefs and practices of teachers through formal and informal interventions. These interventions aim to address specific needs and bring about positive changes in the respective contexts.

The intervention in this action research is to provide a very clear

The interventions planned to adopt in this study is SKEMUS

- Sharing information
- Knowledge
- Example
- Memory
- Understand
- Skill

The investigator selected an intervention for enhancing the understanding **SKEletal** and **MUScular** organ system among standard VI students through **SKEMUS**.

The students are very much exposed to different learning styles and now we are engaged with student centered teaching – learning processes. Hands-on-experience, project based learning, inquiry based learning are some of the methods the students are very interested. So using different activities such as sharing the previous information, and using their knowledge with activities, giving examples with the functions of the organ system, make their memory to understand the difference and using their skill to identify and categorise the organ system.

So in order to enhance the concept of understanding human organ system among standard VI students, the investigator found the method SKEMUS as the right choice to enhance the understanding the same.

## **8. EXECUTION OF INTERVENTION**

### **8.1 STAGES INVOLVED**

- Selecting a school and class
- Meeting with headmistress and teacher
- Observation of the classroom
- Preparation of tool
- Assessing the entry behavior (pre-test)
- Identifying the problem in answering the questions
- Planning for suitable intervention
- Assessing exit behavior (post-test)
- Comparing the performance of pre-test and post-test scores
- Presenting findings

### **8.2 TARGET GROUP**

Sixteen VI standard students from Quaide milleth Government Higher Secondary School, Melapalayam, Tirunelveli district in the academic year 2023-2024 are selected as the sample for this study.

### **8.3 TOOLS USED**

Pre-test and post-test were administered to the sample before and after the intervention. The test items were selected from the Tamil Nadu Text Book for Standard VI.

### **8.4 STATISTICAL TECHNIQUES APPLIED**

The following statistical techniques were used for analyzing the collected data in the form of pre-test and post-test. The minimum and maximum scores of the pre-test and post-test of the students were compared. In order to find out the performance of the students the investigator had used arithmetic mean of the pre-test and post-test scores.

#### **8.4.1 PERCENTAGE ANALYSIS**

In order to find out the percentage of students having low, average and high level of achievement, the percentage analysis has been made use of in this action research.

#### **8.4.2 ARITHMETIC MEAN**

The researcher has used the following formula for calculating arithmetic mean

$$\bar{X} = \frac{\sum x}{n}$$

Where,

- X = Scores of distribution
- $\Sigma$  = sum of
- n = Number of Variables in the data set

#### **8.5 PROCEDURE OF INTERVENTIONS**

##### **PREPARATION OF TOOLS**

1. Test items prepared for pre-test and post-test
2. The test items have been selected from the science text book of standard VI

##### **INTERVENTIONS**

- a) Sharing information - Power point presentation
- b) Knowledge about the organ system - Video clippings
- c) Enriching – concepts
- d) Memory – using colour pictures and identify the organ system and the parts
- e) Understanding - worksheets
- f) Skill – draw the diagrams of skeletal and muscular system

### Step 1 :

Twenty five items have been selected from standard VII science textbook to examine the students understanding of the concept of classification of plants (Annexure -1)

### Step 2:

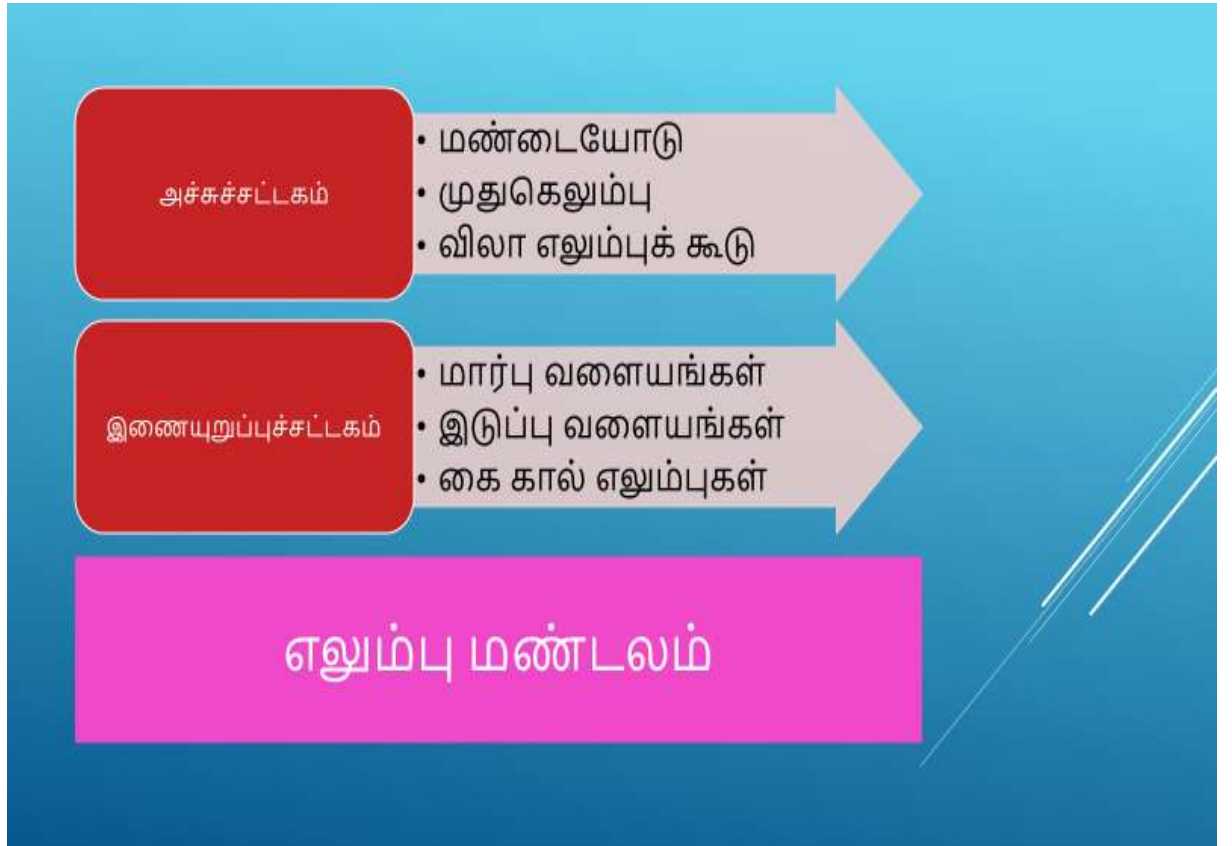
Pretest was administered with strict supervision. Students' performance on pre-test was evaluated.

### Step 3:

The power point presentation, video clippings was prepared by the investigator. And some of the slides are given below.

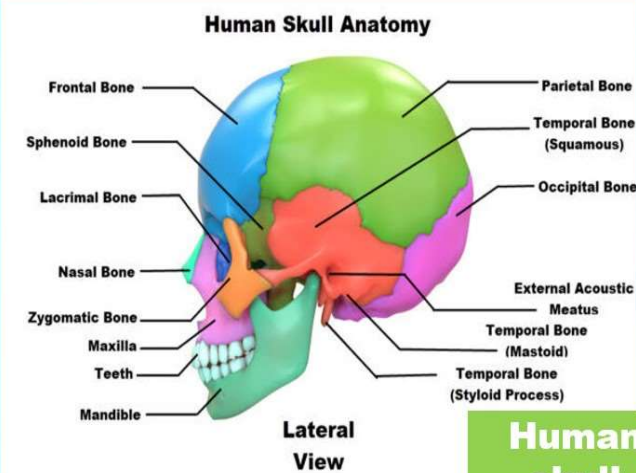
### Sharing information - Power point presentation

Initially the investigator explains the skeletal and muscular organ system and how they inter collaborated. This power point presentation provides a detailed account on:



Powerpoint presentation explaining the organ system

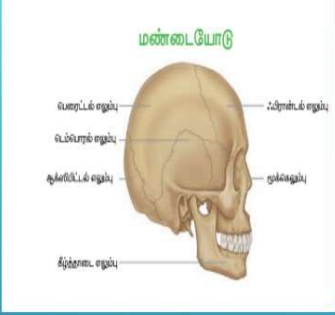
### Human Skull Anatomy



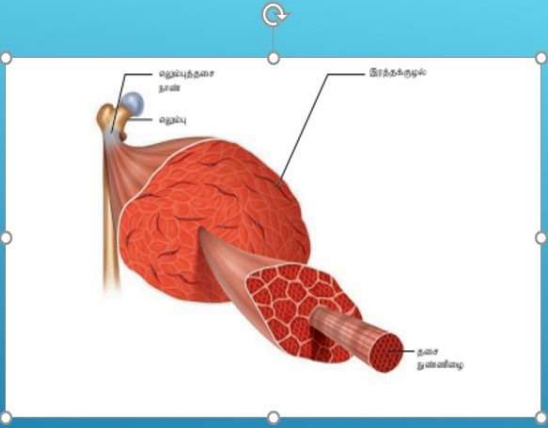
**Lateral View**

- Frontal Bone
- Sphenoid Bone
- Lacrimal Bone
- Nasal Bone
- Zygomatic Bone
- Maxilla
- Teeth
- Mandible
- Parietal Bone
- Temporal Bone (Squamous)
- Occipital Bone
- External Acoustic Meatus
- Temporal Bone (Mastoid)
- Temporal Bone (Styloid Process)


மண்டையோடு



Human skull



தசை மண்டலம்

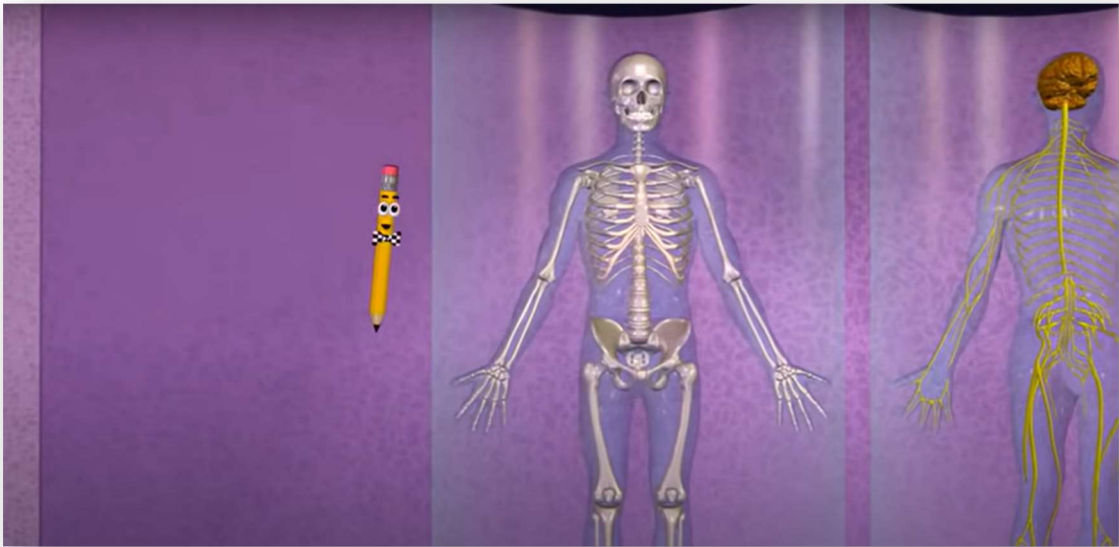


MUSCULAR SYSTEM

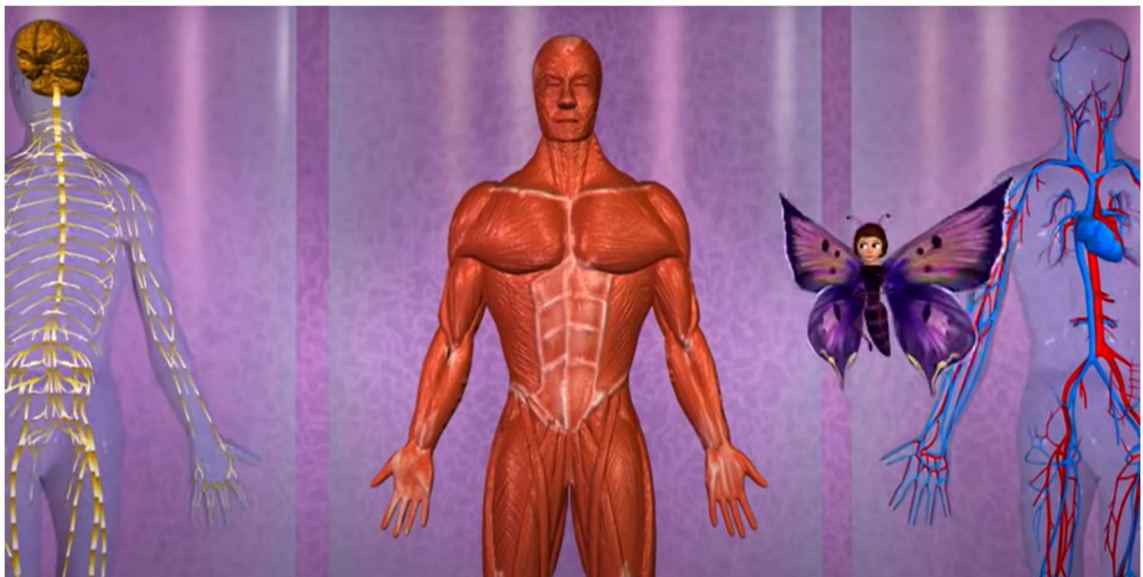
## **Knowledge about the organ system - Video clippings**

Videos explaining the skeletal and muscular system were shown to students to understand the concept. They came with an idea about the bones, cartilages, ligaments and tendons. They also clear with the two major divisions of the skeletal system that are: Axial skeleton and Appendicular skeleton.

### **skeletal system**



### **muscular system**



## You tube videos showing skeletal system



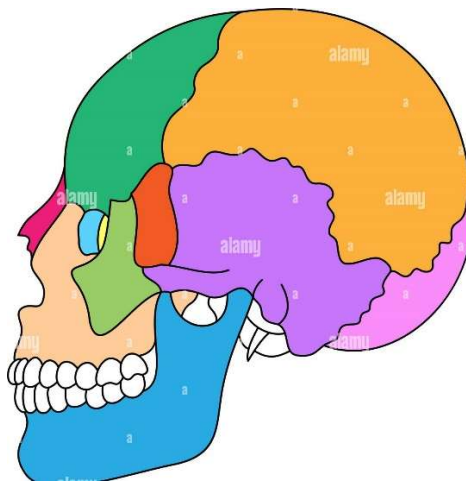
## Enriching the concepts through videos



### **Memory – using colour pictures and identify the organ system and the parts**

After the power point presentation and video clippings are shown and explained to the students, the students were very interested involving in understanding the skeletal and muscular system. Then the students were asked to check their knowledge of understanding towards the concept by a memory activity. In this activity coloured picture was given to the students in group and they were instructed to identify the parts of the system.

#### **Colour picture of a skull**



The students were engaged in the activity and they knew skull is made up of cranial bones and facial bones. It protects the brain and structure of the face. The hyoid bone present at the base of the buccal cavity and the auditory ossicles (Malleus, Incus and stapes) are also included in the skull. Lower jaw bone is the largest and strongest bone in the human face.

**Students involved in activity – Identifying parts of skull**



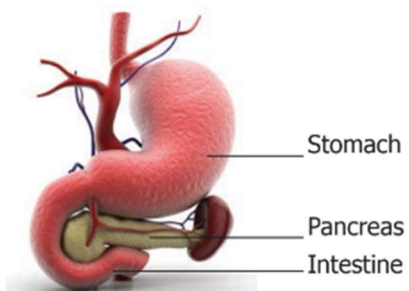
## Differentiating types of muscles



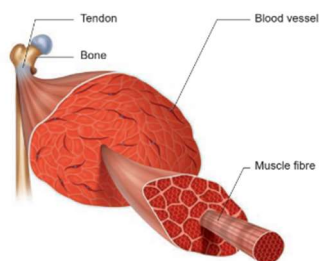
### Understanding and skill - Using worksheets

#### Types of muscles

##### Skeletal muscles

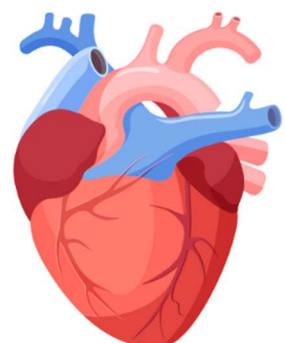


##### Smooth muscle



##### Cardiac muscle

Heart



## PRE TEST & POST TEST



## **8.6 DURATION OF INTERVENTION**

Since the action research is a method of solving the problem of understanding of skeletal and muscular system among standard VI students, 7 days were given for enhancing the understanding. Enough time and intervention provided to strengthen the understanding the concept for the target group.

## **8.7 EVIDENCES COLLECTED**

The investigator collected the evidences through pre-test and post-test. The scores are calculated and analysed.

## **9. DATA COLLECTION AND ANALYSIS**

The collected data were processed and analysed with the help of percentage, frequency, mean, and graphical representation in order to find out the meaningful interpretation of raw scores. They are presented systemically in the following pages.

### **ANALYSIS AND INTERPRETATION**

Analysis and interpretation of the data allows the researchers to begin thinking about what is happening, why it is happening and how it fits into the big picture. After the collection of data careful examination on the key points reveal particular phenomena about the new strategy. Using statistical analysis the results are interpreted.

### **STATISTICAL ANALYSIS**

#### **Pre test**

The pre-test was conducted by the investigator to every individual to attend the questionnaire developed. The responses are scored.

#### **Post test**

The post test was conducted after the investigator exercise the remedial measures through video clippings and drawings. The students to gain sufficient efficiency in the expected level of understanding the concept. The understanding of the concepts were scored using the same calculation employed in the pre-test.

#### **Frequency**

The frequency table was created for the pretest and posttest percentage of marks for the students

#### **Arithmetic mean**

The investigator has used the following formula for calculating Arithmetic mean.

### **Chart/Bar graphs**

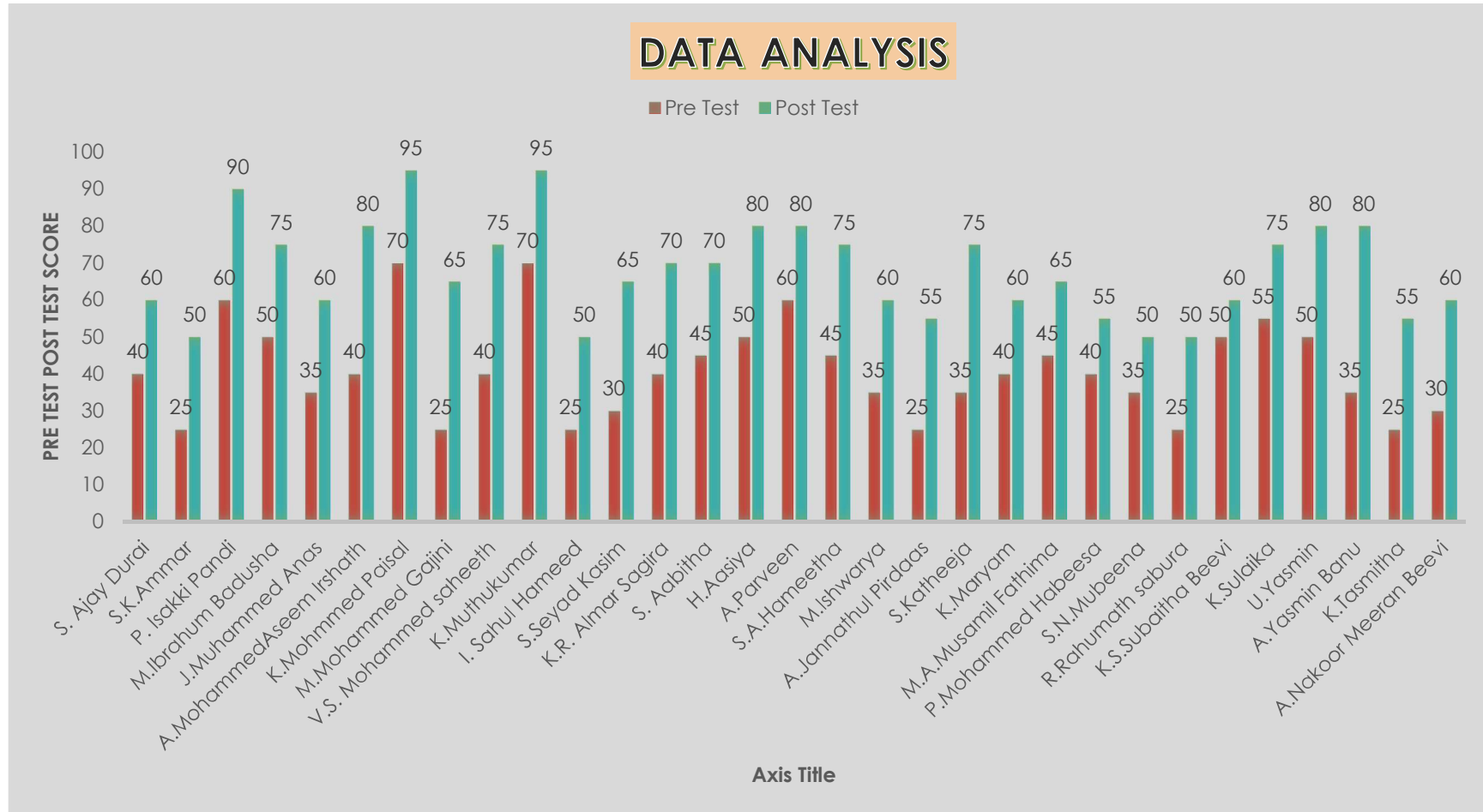
The chart on improvement of the students understanding of the concept while using video clippings and images of plants to understand the concepts of classification of plants was shown.

**Table : 1. Data analysis**

<b>S.NO</b>	<b>NAME OF THE STUDENTS</b>	<b>PRE TEST</b>	<b>PERCENTAGE</b>	<b>POST TEST</b>	<b>PERCENTAGE</b>
1.	S. Ajay Durai	8	40	12	60
2.	S.K.Ammar	5	25	10	50
3.	P. Isakki Pandi	12	60	18	90
4.	M.Ibrahum Badusha	10	50	15	75
5.	J.Muhammed Anas	7	35	12	60
6.	A.MohammedAseem Irshath	9	40	16	80
7.	K.Mohammed Paisal	13	70	19	95
8.	M.Mohammed Gajini	5	25	13	65
9.	V.S. Mohammed saheeth	8	40	15	75
10.	K.Muthukumar	14	70	19	95
11.	I. Sahul Hameed	5	25	10	50
12.	S.Seyad Kasim	6	30	13	65
13.	K.R. Almar Sagira	8	40	14	70
14.	S. Aabitha	9	45	14	70
15.	H.Aasiya	10	50	16	80
16.	A.Parveen	12	60	16	80
17.	S.A.Hameetha	9	45	15	75
18.	M.Ishwarya	7	35	12	60
19.	A.Jannathul Pirdaas	5	25	11	55
20.	S.Katheerja	7	35	15	75
21.	K.Maryam	8	40	12	60

22.	M.A.Musamil Fathima	9	45	13	65
23.	P.Mohammed Habeesa	8	40	11	55
24.	S.N.Mubeena	7	35	10	50
25.	R.Rahumath sabura	5	25	10	50
26.	K.S.Subaitha Beevi	10	50	12	60
27.	K.Sulaika	11	55	15	75
28.	U.Yasmin	10	50	16	80
29.	A.Yasmin Banu	7	35	16	80
30.	K.Tasmitha	5	25	11	55
31.	A.Nakoor Meeran Beevi	6	30	12	60
<b>Total/Average</b>		<b>255</b>	<b>1275</b>	<b>423</b>	<b>2115</b>

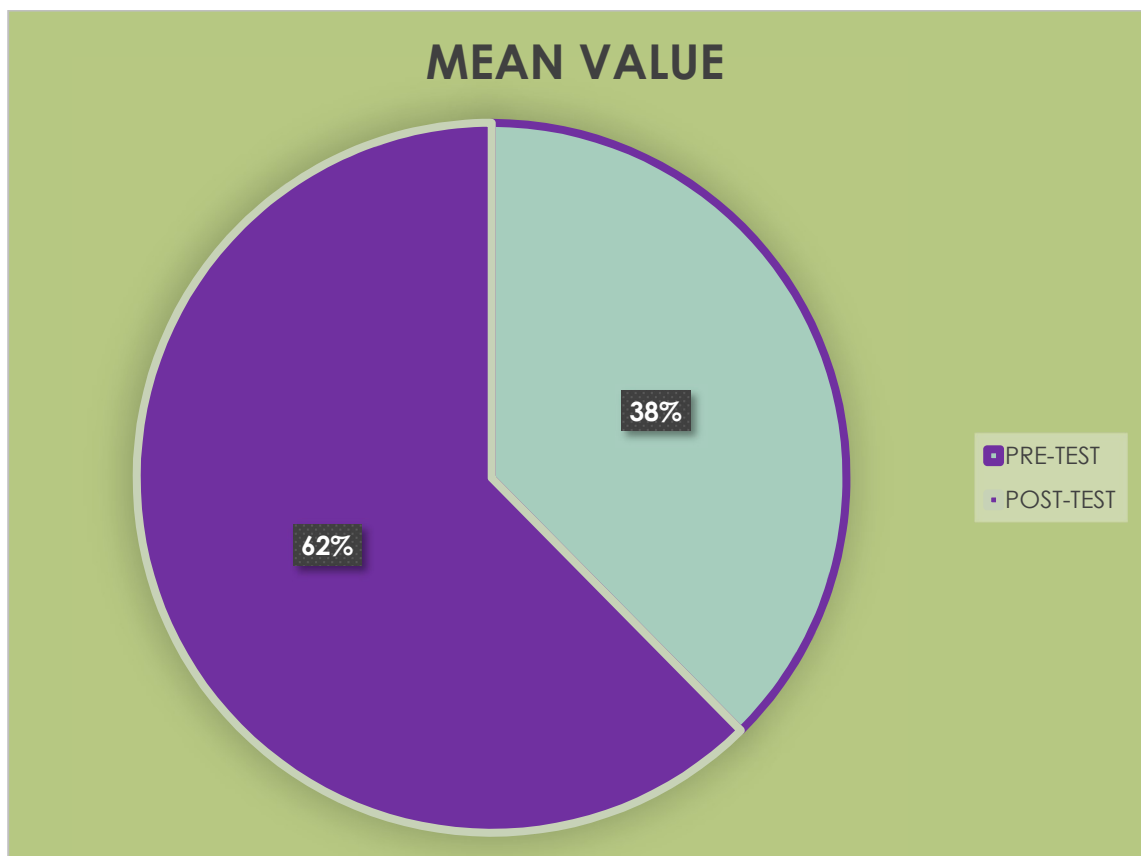
**Graph – 1 : Data Analysis**



**Table 2: Mean score of pre-test and post-test**

<b>TEST</b>	<b>MEAN VALUE</b>
<b>PRE-TEST</b>	<b>41.12</b>
<b>POST-TEST</b>	<b>68.22</b>

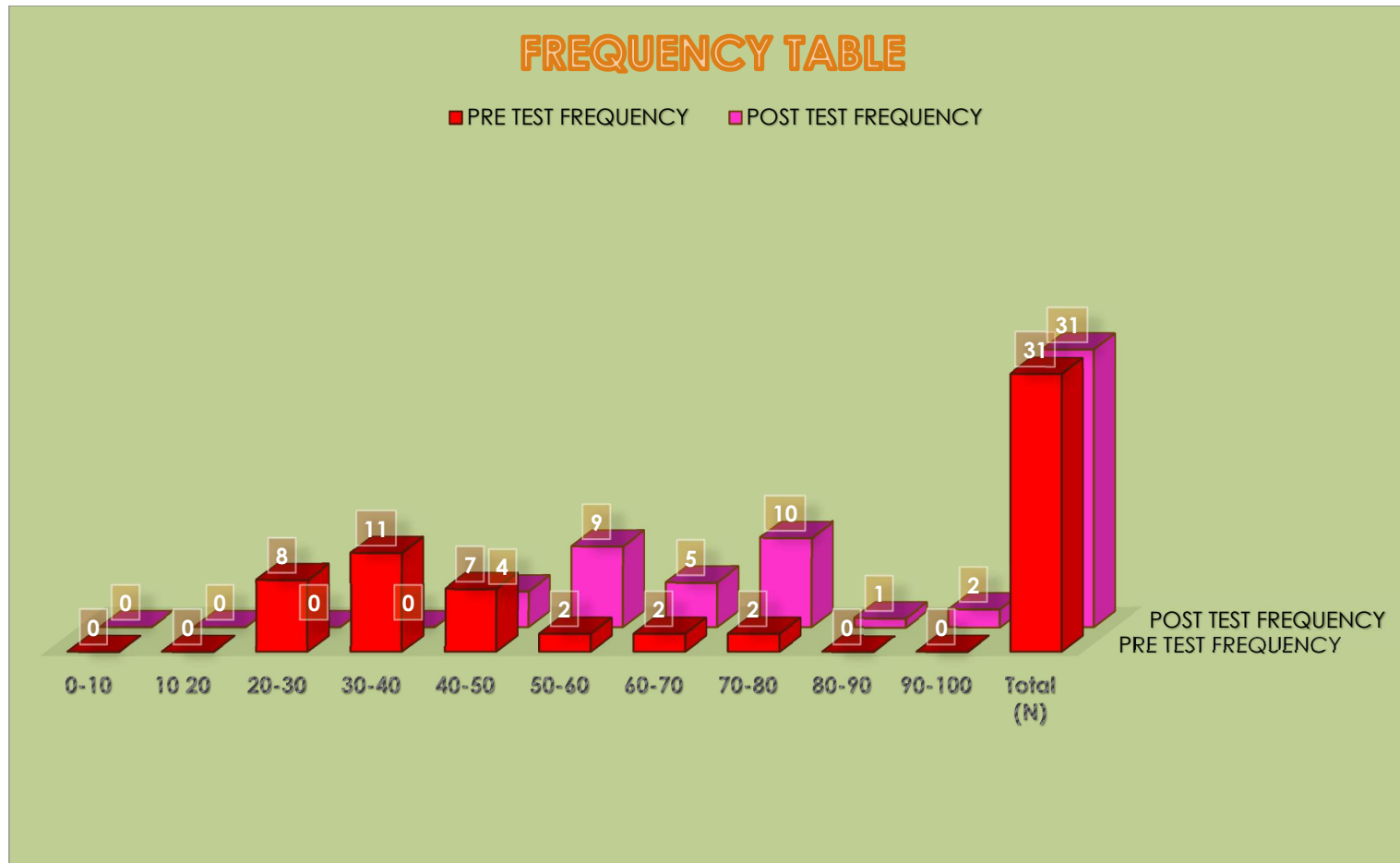
It is inferred from the table no.2 that the mean value of pre-test is 41.12 and the mean value of post-test is 68.22



**Table:3. Frequency table**

<b>SCORE INTERVAL</b>	<b>PRE TEST FREQUENCY</b>	<b>POST TEST FREQUENCY</b>
0-10	0	0
10-20	0	0
20-30	8	0
30-40	11	0
40-50	7	4
50-60	2	9
60-70	2	5
70-80	2	10
80-90	0	1
90-100	0	2
<b>Total (N)</b>	<b>31</b>	<b>31</b>

Graph – 3 : Frequency Table

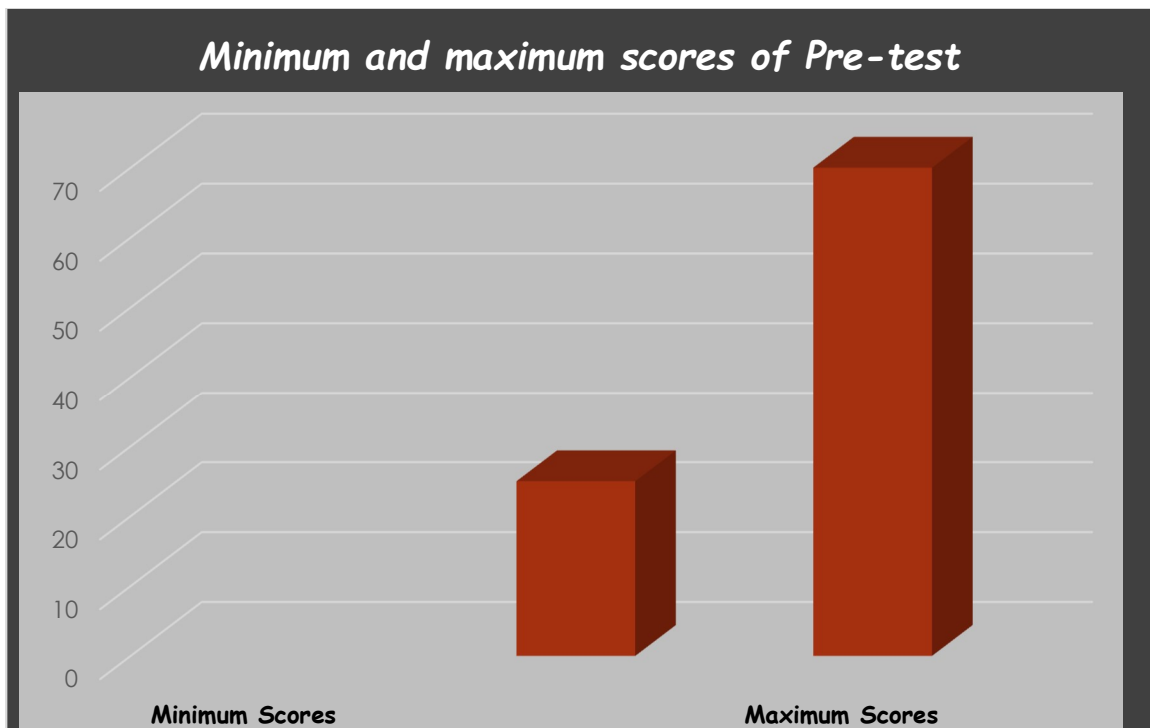


**Table:4. *Minimum and maximum scores of Pre-test***

S.No	TEST	PRE-TEST
1	<b>Minimum Scores</b>	25
2	<b>Maximum Scores</b>	70

It is inferred from the table no.4 that the minimum score in pre test is 25 and maximum score in post test is 70

**Graph – 4 : *Minimum and maximum scores of Pre-test***

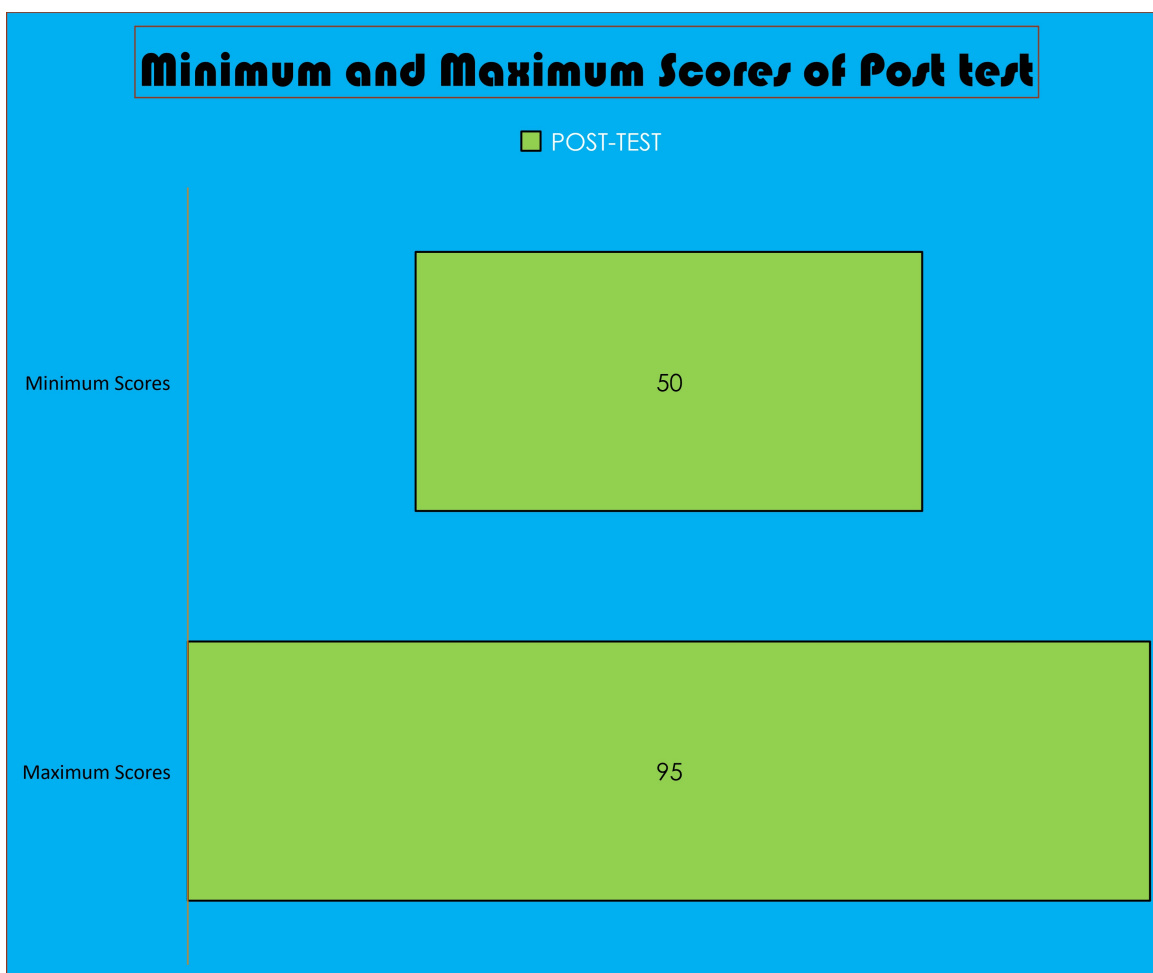


**Table :5 Minimum and Maximum Scores of Post test**

S.No	TEST	POST-TEST
1	Minimum Scores	50
2	Maximum Scores	95

It is inferred from the table no.4 that the minium score in post test is 50 and maximum score in post test is 95

**Graph -4 Minimum and Maximum Scores of Post test**



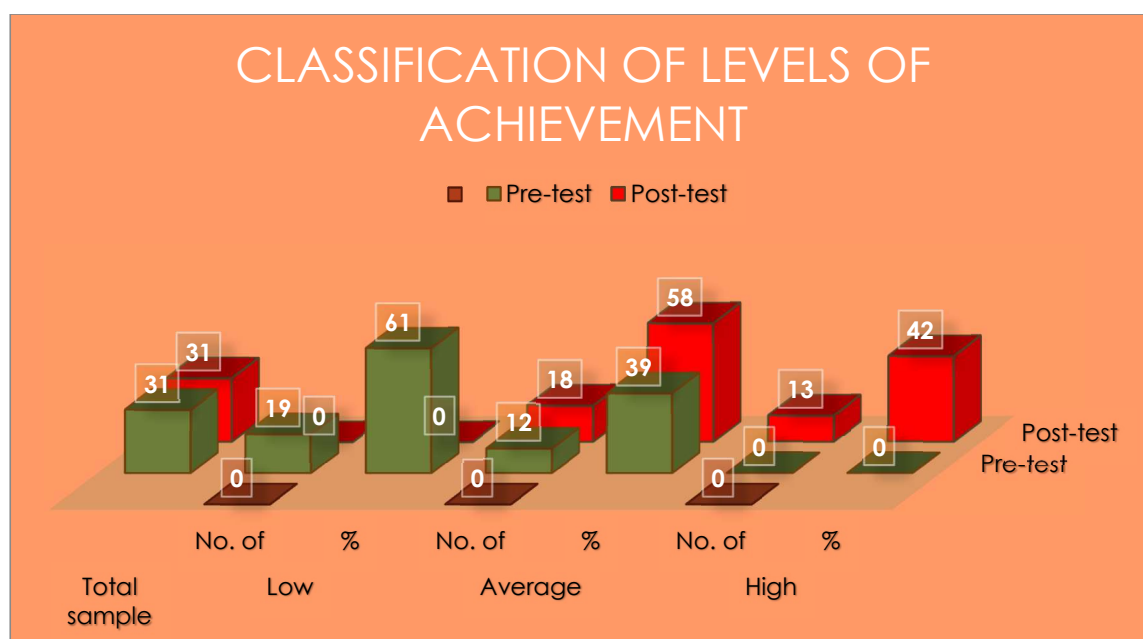
**Table-5. Classification of levels of Achievement**

Subject Classification	Test	Total sample	Low		Average		High	
			No. of Students	%	No. of Students	%	No. of Students	%
Total Target Group	Pre-test	31	19	61	12	39	0	0
	Post-test	31	0	0	18	58	13	42

It is inferred from the table no.5 that 61% of the students are under below average, 39% of the students are under average category and no students are at above average in Pre test.

On the contrary no students are under below average, 58% of students are score at average level and 42% of students are at high level in Post test

**Graph -5 Classification of levels of Achievement**



## **10. DECISION MAKING AND REFLECTION**

It is evident from the data analysis that the students of Standard VI of Quaide Milleth Government Higher Secondary School, Melapalayam, Tirunelveli who were taken as the target group for the action research have improved their understanding towards the concept of skeletal and Muscular system. The interventions through multiple activities and via multimedia have brought about improvement to a maximum level. As the researcher has preplanned, the interventions have gradually yielded the expected outcome among the target group. Everything went on as well as expected. Their performance level of enhancing the understanding has almost tripled. Hence the investigator has decided to end the action research and not to proceed to the next spiral.

## **11. TERMINATION**

In the beginning of the action research, the researcher felt the dissatisfaction with the students understanding in the concept of skeletal and muscular system. Identifying the problem in the understanding level and the investigator thought to use the strategy of using different activities like worksheets, picture identification, videos in classroom will certainly enhance the understanding level of the students in the same concept.

Accordingly, the intervention planned and executed giving enough time and the result was fully satisfactory. Hence the researcher decided to terminate the action research and the net result becomes the end of interventions

## **12. FINDINGS**

**Pre-test mean** = 41.12

**Post-test mean** = 68.22

By explaining the basic concepts by using video clippings, power point presentation, worksheets, pictures of the human organ system create involvement among the students in understanding the concept of skeletal and muscular system.

### **Pre-test and Post-test comparison**

1. The pre-test findings show that 61 percent of the students are under low level, 39 percent are average level and there is no students having high score. In post test scores no students are at low level of marks and 58 percent of the students are at average level and 42 percent of students have got high level. This shows that all students are improved in their achievement.
2. The minimum score in pre-test is 25, and minimum score in post-test is 70. The maximum score in pre-test is 50 and that for post test is 95. Thus it is clear that SKEMUS the multiple activities like using pictures, worksheets and videos explaining the concept enhance the understanding of skeletal and muscular system in a clear way.
3. The pre-test mean score of the students was 41.12. The post-test mean score of the students was 68.22. This clearly shows that grasping power of students using different activities make them to show more interest and help them to understand the concept easily.

### **13. NET GAINS**

The difficulty in understanding the concept of muscular and skeletal system of human organ system among standard VI students in Quaide Milleth Governement Higher Secondary School, Melapalayam was identified by the investigator and the concept understanding was enhanced using the method of SKEMUS. This method involved a multiple activities like explanations, demonstration, worksheet activity, audio visual clippings, colourful pictures, etc. the students were very interested and involved in listening and doing the activities and their performance were improved.

- ❖ The incorporation of multiple activities in teaching learning practices engage the students in learning.
- ❖ Student centric discussion allows the students to understand the concepts via collaboration and cooperation.
- ❖ The group activity involves the students to participate more actively. It boosts the students confidence, productivity and implementation skills.
- ❖ It improves their comprehension, listening skills that reflect in their assessments.
- ❖ Different minds generate various perspectives and viewpoints that help students understand the concepts better and more effectively.
- ❖ Visual, auditory and kinesthetic (VAK) type of learning opportunity was provided and it focuses on improved learning experiences of the students. Worksheet and skill of drawing makes the students understand the concept at their own pace.
- ❖ Totally the differentiated instruction entails adapting the needs of each individual. Diversify materials, method, learning environment, evaluation by their own, group activity were very successful in understanding the concept.

## **14. COLLABORATORS**

1. Dr. P.Golda Grena Rajathi, Principal, DIET, Munanjipatti
2. Mrs. M. T. Manjula Devi, Senior Lecturer
3. Dr. S. Sahaya Ponmalar, Lecturer
4. Dr. M. Gnanasoundari, Lecturer
5. Head Mistress, Quaide millet Government Higher Secondary School,  
Melapalayam
6. Mr. Sam, BT Asst, Quaide millet Government Higher Secondary School,  
Melapalayam

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[https://bio.libretexts.org/Bookshelves/Introductory\\_and\\_General\\_Biology/Book%3A\\_General\\_Biology\\_\(Boundless\)/38%3A\\_The\\_Musculoskeletal\\_System/38.01%3A\\_Types\\_of\\_Skeletal\\_Systems\\_-\\_Functions\\_of\\_the\\_Musculoskeletal\\_System](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/38%3A_The_Musculoskeletal_System/38.01%3A_Types_of_Skeletal_Systems_-_Functions_of_the_Musculoskeletal_System)

# APPENDIX

மாவட்ட ஆசிரியர் கல்வி மற்றும் பயிற்சி நிறுவனம், முனைஞ்சிப்பட்டி.

செயலாராய்ச்சி

ஆய்வாளர்: வே. ரூபிசெல்வராணி

மாணவர் பெயர்: \_\_\_\_\_

வகுப்பு: VI

1.சரியான விடையைத் தேர்ந்தெடுத்து எழுதுக.

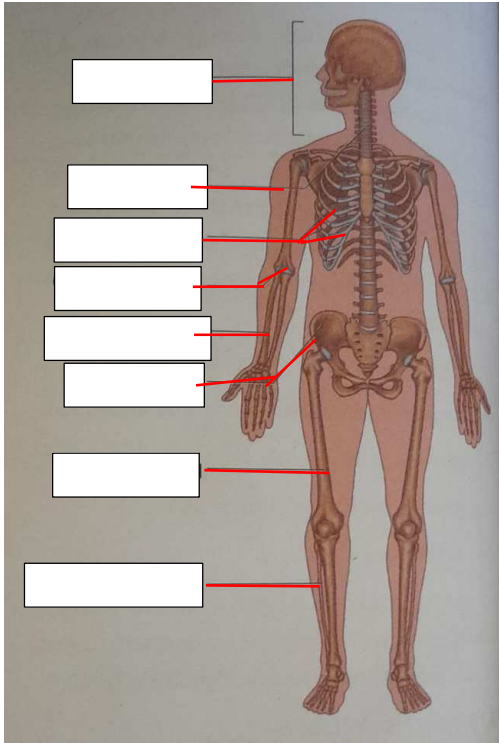
1.மனிதனின் எலும்பு மண்டலம் \_\_\_\_\_ எலும்புகளை உடையது?

அ) 209      ஆ)206      இ) 602      ஈ) 902

2. இணையுறுப்புச் சட்டகம் அல்லாதது?

அ) மார்பு வளையங்கள் ஆ) கை கால் எலும்புகள் இ) இடுப்பு வளையங்கள் ஈ) முதுகெலும்பு

3. எலும்பு மண்டலத்தின் சரியான பாகங்களை தேர்ந்தெடுத்து எழுதுக.



அ) முன்கை எலும்பு  
ஆ) இடுப்பெலும்பு  
இ) முழங்கால் எலும்பு  
ஈ) தண்டுவடம்  
உ) மேற்கை எலும்பு  
ஊ) தொடை எலும்பு  
எ) விலா எலும்புகள்  
ஏ) மண்டையோடு

4. தசைகள் எத்தனை வகைப்படும்?

அ) 2      ஆ) 3      இ) 4      ஈ) 5

5. வாய்க்குழியின் அடித்தளத்தில் காணப்படும் எலும்பு

அ) சுத்தி எலும்பு      ஆ) பட்டடை எலும்பு      இ) ஹயாய்டு எலும்பு      ஈ) அங்கவடி எலும்பு

## II. கோடிட்ட இடத்தை நிரப்புக

6. தண்டுவடத்தை பாதுகாப்பது \_\_\_\_\_
7. நமது உடலில் காணப்படும் மிகச் சிறிய எலும்பான அங்கன்வாடி எலும்பின் நீளம் \_\_\_\_\_.
8. உணவுக்குழல், சிறுநீர்ப்பை, மற்றும் பிற உள்ளுறுப்புகளின் சுவர்களில் காணப்படும் தசைகள் \_\_\_\_\_.
9. விலா எலும்புக்கூடு \_\_\_\_\_ இணைகள் கொண்ட வளந்த, தட்டையான விலா எலும்புகளைக் கொண்டுள்ளது.
10. தசைகள் இணைக்கப்படுவதற்கு ஏற்ற பகுதியாக \_\_\_\_\_ திகழ்கின்றன.
11. நம் முன்னங்கையை தூக்கி உயர்த்தும்பொழுது \_\_\_\_\_ சுருங்கி, சிறியதாகிறது, அதே சமயம் \_\_\_\_\_ விரிந்து கையை மேலே உயர்த்த உதவுகிறது.

## III. சரியா / தவறா என எழுதுக

13. எலும்புகளை அசைவிக்க இரு தசைகள் தேவைப்படுகிறது.

சரி	தவறு
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14. நமது உடலின் நீளமான எலும்பு முழங்கால் எலும்பு ஆகும்.

சரி	தவறு
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15. எலும்புத் தசைகள் கட்டுப்படாத இயங்கு தசைகள் எனப்படும்

சரி	தவறு
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## IV. பொருத்துக

16.	மென் தசைகள்	மண்டையோடு	
17.	அச்சச்சட்டகம்	12 இணை	
18.	எலும்புத் தசைகள்	உணவுக் குழல்	
19.	இணையுறுப்புச் சட்டகம்	கைகளில் உள்ள தசைகள்	
20.	விலா எலும்புக் கூடு	இடுப்பு வளையங்கள்	



**II. FILL IN THE BLANKS**

- 6. Spinal cord is protected by \_\_\_\_\_
- 7. The smallest bone in our body called stapes inside the ear length is \_\_\_\_\_
- 8. Muscles found in the walls of digestive tract, urinary bladder, arteries are \_\_\_\_\_
- 9. The rib cage is made up of \_\_\_\_\_ pairs of curved, flat rib bones.
- 10. \_\_\_\_\_ connect bone to muscle.
- 11. When we raise our hand, the \_\_\_\_\_ in front become short by contraction and the \_\_\_\_\_ at the back stretch to pull the arm.

**III. MAKE A TICK MARK IN THE CORRECT BOX YES/NO**

- 12. Two muscles are required to move a bone at a joint 

YES	NO
-----	----
- 13. The longest bone in the body is the thigh bone 

YES	NO
-----	----
- 14. Skeletal muscles are Involuntary muscles 

YES	NO
-----	----

**IV. MATCH THE FOLLOWING**

16.	Smooth muscles	Skull	
17.	Axial skeleton	12 pairs	
18.	Skeletal muscles	Digestive tract	
19.	Appendicular skeleton	Muscles of arm	
20.	Rib cage	Pelvic girdles	

**1.Name of the Investigator :** Mrs. V. Rubyselvarani, Lecturer

**2.Name of the DIET :** Tirunelveli

**3.Title :**

Enrichment of standard VI students in understanding skeletal and Muscular system with interrelationship through 'SKEMUS'

**4.Objectives:**

To make the students understand the concept of muscular and skeletal system with interrelationship.

**5.Sample:**

The VI standard students studying in Government Higher Secondary School, Melapalayam are selected as the sample for this study.

**6.Tool:**

Pre-test and post-test will be administered to the sample before and after interventions.

**7.Methodology:**

Pre test – Post test Single group design will be followed in this study.

**8.Findings:**

1. The pre-test findings show that 61 percent of the students are under low level, 39 percent are average level and there is no students having high score. In post test scores no students are at low level of marks and 58 percent of the students are at average level and 42 percent of students have got high level. This shows that all students are improved in their achievement.
2. The pre-test mean score of the students was 41.12. The post-test mean score of the students was 68.22. This clearly shows that grasping power of students using different activities make them to show more interest and help them to understand the concept easily.

## 4 -PHOTOS WITH EXPLANATIONS

### PRE TEST



### Identification of skeletal parts using coloured picture



## Video presentation on Muscular System



## POST TEST

