ENHANCING THE UNDERSTANDING THE CONCEPT OF LIGHT AMONG VIII STANDARD STUDENTS THROUGH MULTIMEDIA

An Action Research Report Submitted to

THE STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING,

COLLEGE ROAD, CHENNAI - 600006.

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2023 - 2024

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CERTIFICATE

This is certified that the Action Research entitled "**ENHANCING THE UNDERSTANDING THE CONCEPT OF LIGHT AMONG VIII STANDARD STUDENTS THROUGH MULTIMEDIA**" is an original and independent action research work done by **Dr. P.PALANISAMY**, Lecturer, District Institute of Education and Training, Pudukottai. It has not previously formed the basis for any other action research work or for the award.

Place:
Date: **Principal**

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DECLARATION

I hereby declared that the Action Research entitled "**ENHANCING THE UNDERSTANDING THE CONCEPT OF LIGHT AMONG VIII STANDARD STUDENTS THROUGH MULTIMEDIA"** is an original and independent work done by me and it has not formed the basis for any other programme, action research work (or) any award.

(Dr. P.PALANISAMY)

ACKNOWLEDGEMENT

I express my thanks for the **Director** and the **Joint Directors** of **State Council of Educational Research and Training** who has given me the opportunity to conduct the research.

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Then, we express our thanks to **Mrs M.Punitham, Principal** for his continuous guidance and suggestions for the successful completion of this Action Research.

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Station: Pudukottai **(P.PALANISAMY)**
Date:

CONTENT

1. INTRODUCTION

In the realm of education, the comprehension of fundamental scientific concepts plays a pivotal role in shaping students' intellectual foundations. Focusing specifically on eighth-grade students, this initiative aims to enhance their understanding of the intricate concept of light through the integration of multimedia tools. Recognizing the significance of a multifaceted approach, this endeavor seeks to leverage various digital resources, such as interactive presentations, animations, and visual aids, to create an engaging and immersive learning experience. By incorporating multimedia elements into the educational framework, the objective is to foster a more profound and accessible understanding of the principles governing light, ultimately enriching the learning journey for eighth-grade students.

Science is not merely a collection of facts, concepts, and useful ideas about nature, or even the systematic investigation of nature, although both are common definitions of science. Science is an interesting subject, the understanding of which is essential to the understanding of day to day scientific conditions.. Science is a systematic endeavor that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Systematic, comprehensive, investigation and exploration of natural, causes and effect is the full form of Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence In science class, teachers face challenges like the above. One of the main challenge the science

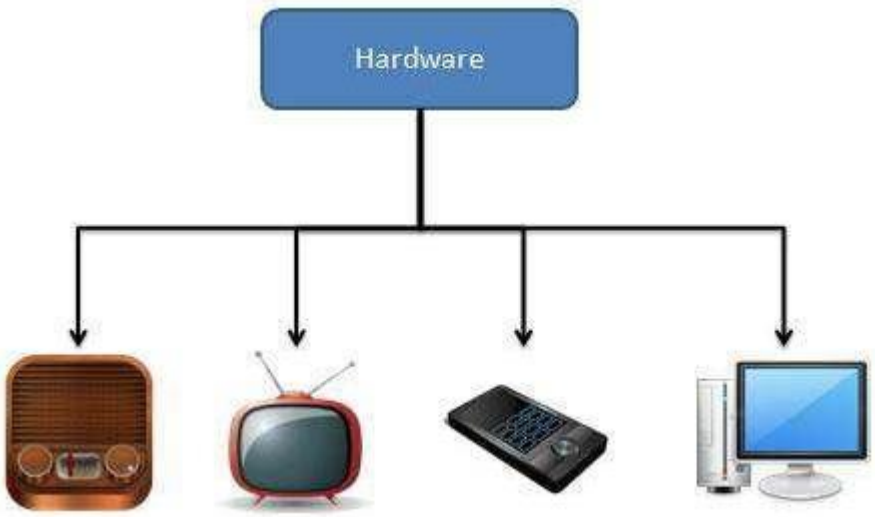
concepts always teach through abstract method, It has a specific role, as well as a variety of functions for the benefit of our society: creating new knowledge, improving education, and increasing the quality of our lives..This research study focuses on this issue.

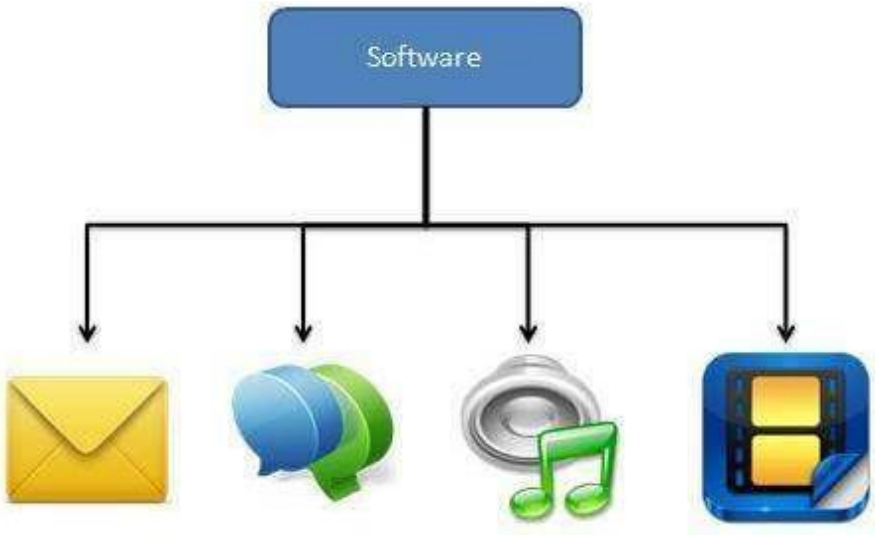
Multimedia

The term multimedia can be broken down its constituent elements like: multi, which means more than one and media, a plural form, refers to the means for conveying information. So, multimedia can be seen as a collection of various media formats like text, images, audio, video, animation and graphics blend together to give rise to an effective unified whole, which is capable of holding the attention, and enriching the user or the learner. Thus, there are several formats of information content and information processing in media (e.g. text, audio, graphics, animation, video, and interactivity) are being utilized for the information or entertainment of the user or learner is known as multimedia. Multimedia is an interactive media and provides multiple ways to represent information to the user in a powerful manner. It provides an interaction between users and digital information. It is a medium of communication. Some of the sectors where multimedia is used extensively are education, training, reference material, business presentations, advertising and documentaries.

By definition Multimedia is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation. In other words, Multimedia is a computerized

method of presenting information combining textual data, audio, visuals (video), graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS). Multimedia as name suggests is the combination of Multi and Media that is many types of media (hardware/software) used for communication of information.





ADVANTAGES OF USING MULTIMEDIA

- **Learner Centered:** As Cognitive theory of Multimedia Learning (CTML) strongly recommends that multimedia learning is a learner centered learning. Captures Attention of Learners: It captures attention of the learner. Multimedia makes the content very entertaining.
- **Motivation**: It motivates the learners, as they become curious knowing that they are going to study in a novel way.
- **Learning Styles Addressed**: It allows teacher to address variety of learning styles in the class room. It provides multiple ways to present the content, thus helps in addressing the needs of diverse learners in a classroom.
- **Technology Needs Addressed**: A learner in today's world is a 'digital learner', those does not want to learn through traditional method. Learning through technology supported instructions is more engaging for him/her rather than traditional methods. So, through multimedia package the technology need of the learners is very well addressed.
- **Develops HOTS:** Higher Order Thinking Skills can be developed by the use of these packages in the classrooms. It raises the level of understanding and application of the learner. With the complete understanding of the topic the learner creates a greater comprehension.
- **Drill and Practice**: Learners prefer practicing and studying through multimedia. It gives them inner motivation for practice resulting in good achievement.

- **Expansion of Learning**: It helps learners to expand and retain their learning because they are engaged, using multiples senses resulting in fun filled learning.
- **Organization of Teaching**: These packages help a teacher to organize their teaching and in that way save time and energy with better learning outcomes of learners. It helps the teacher to prepare well for the class in advance for effective delivery of technology supported instructions.
- **Classroom Management**: Learners' get engaged and participate actively while learning through multimedia package leaving no space for in discipline in the classroom. So, it helps the teacher in classroom management

2 TITLE

The action research entitled **ENHANCING THE UNDERSTANDING THE CONCEPT OF LIGHT AMONG VIII STANDARD STUDENTS THROUGH MULTIMEDIA**

3. IDENTIFICATION OF THE PROBLEM

Science is considered a difficult subject for many students. Science is systematic and scientific approach subject. Scientific methodology includes the following: Objective observation: Measurement and data . Science fundamentally is the systematic study of the structure and behavior of the natural and physical world through observations and experiments. Study of science evolved with the civilization of human beings. Basically, science is a

systematic study of anything which could be examined, tested, measured, analyzed and verified to find the truth about the object of study itselfBased on the periodical visits before the pandemic period the investigator identified the students faced more difficulties in the concept of light and its laws and applications. When the investigator discussed all these concepts with the science teachers generally, they felt the students found it difficult to the concepts of Light and its properties. Hence this research is taken by the researcher.

The identified problem revolves around the need to enhance the comprehension of the concept of light among eighth-grade students through the integration of multimedia tools. The current challenge lies in traditional teaching methods that may not adequately capture the complexities of the topic, potentially hindering students' understanding. By incorporating multimedia resources, such as interactive presentations, videos, and animations, educators aim to provide a more dynamic and engaging learning experience, catering to diverse learning styles. This approach aims to bridge gaps in understanding and foster a deeper grasp of the fundamental principles of light, ensuring a more comprehensive education for eighth-grade students.

4. NEED AND SIGNIFICANCE OF THE STUDY

Science is nothing but knowledge gained by systematic manner and logical study in any branches of physical, chemical or natural sciences, which is gained through observation and experimentation, as facts or principles or hypothesis, to open up new areas of knowledge. Science is the natural and

life oriented study. .But, students feared about knowledge of Light and its laws and applications to demonstration way as well as learning by doing method. To study about the laws of reflection and the laws of refraction and some of the optical instruments, such as periscope and kaleidoscope, which work on these principles. The Researcher also feels the students' and teachers' difficulty in meeting these challenges. So researcher took this for his action research.

The need for this study on enhancing the understanding of the concept of light among eighth-grade students through multimedia is underscored by the growing importance of technology in education. With traditional teaching methods facing limitations in addressing diverse learning needs, incorporating multimedia tools becomes crucial for creating a more inclusive and effective learning environment. This study holds significance as it not only addresses the challenges in grasping the concept of light but also aligns with the contemporary educational paradigm, fostering an interactive and engaging pedagogical approach. By recognizing the need for multimedia integration, educators can better equip students with a solid foundation in scientific concepts, ensuring that they are well-prepared for the demands of a technologically advanced world.

5. OBJECTIVES OF THE STUDY

1. To identify the level of pre knowledge about light and its laws and applications among VIII standard students.
2. To design activities incorporating multimedia on light and its laws and applications explained with different teaching learning process (Video mode)
3. To implement the designed activities on light and its laws and applications for better understanding of students.
4. To find out the level of post knowledge about light and its laws and applications

6. HYPOTHESES OF THE STUDY

1. The level of pre and post test knowledge about light and its laws and applications among VIII standard students.
2. There is no significant difference if any between pre and post test of light and its laws and applications among VIII standard students.
3. There is no significant difference if any between pre and post test of light and its laws and applications among VIII standard students with respect to gender.

7. METHODOLOGY:

Research method

The present study experimental method with single group design was adopted

Sample :

For this present study 49 students of VIII from Panchayath Union Middle School, Meboothakudi, Viralimalai block, Pudukkottai district were selected by investigator. Purposive sampling techniques used for this action research.

Tools :

The investigator made achievement test was conducted. The same test tool was used for both pre -test and post -tests. The investigator has conducted pre-test at the beginning of the study and a post test was conducted after providing a suitable teaching learning process through Multimedia.

8. INTERVENTION

The selected upper primary school students should be used to intervention with teaching learning process through Multimedia

ACTIVITIES THROUGH MULTIMEDIA

ACTIVITY 1

INTRODUCTION ABOUT LIGHT (LECTURE METHOD)

Light is a form of energy and it travels in a straight line. Light is reflected by the polished surfaces such as plane mirrors. This reflecting property of light is applied in various devises that we use in our daily life. Types of mirrors like spherical mirrors and parabolic mirrors. You will study about the laws of reflection and the laws of refraction and some of the optical instruments, such as periscope and kaleidoscope.

The Investigator briefly explained about introduction of light.

The students made the activity ralated to light. Light travels in a straight line.

ACTIVITY 2

MIRRORS (THROUGH ICT)

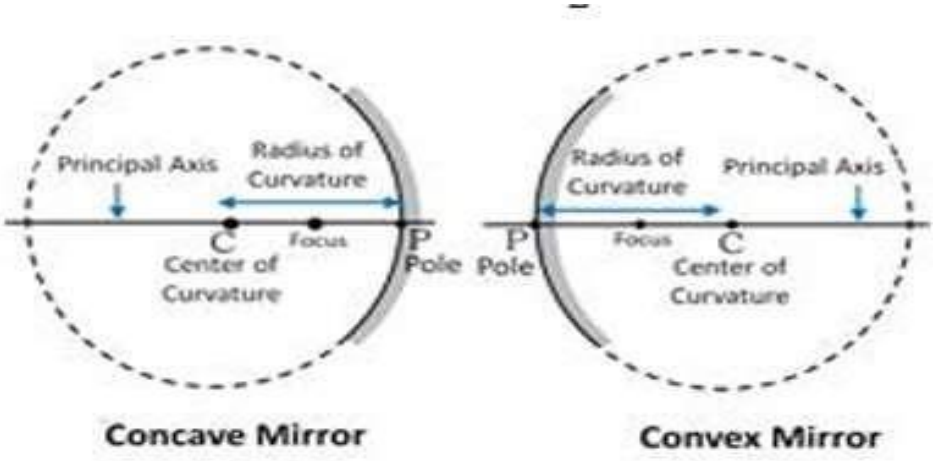
We use mirrors in our daily life for various purposes. The mirror is an optical device with a polished surface that reflects the light falling on it. A typical mirror is a glass sheet coated with aluminum or silver on one of its sides to produce an image. Mirrors have a plane or curved surface. Curved mirrors have surfaces that are spherical, cylindrical, parabolic and ellipsoid. The shape of a mirror determines the type of image it forms. Plane mirrors form the perfect image of an object. Whereas, curved mirrors produce images that are either enlarged or diminished.

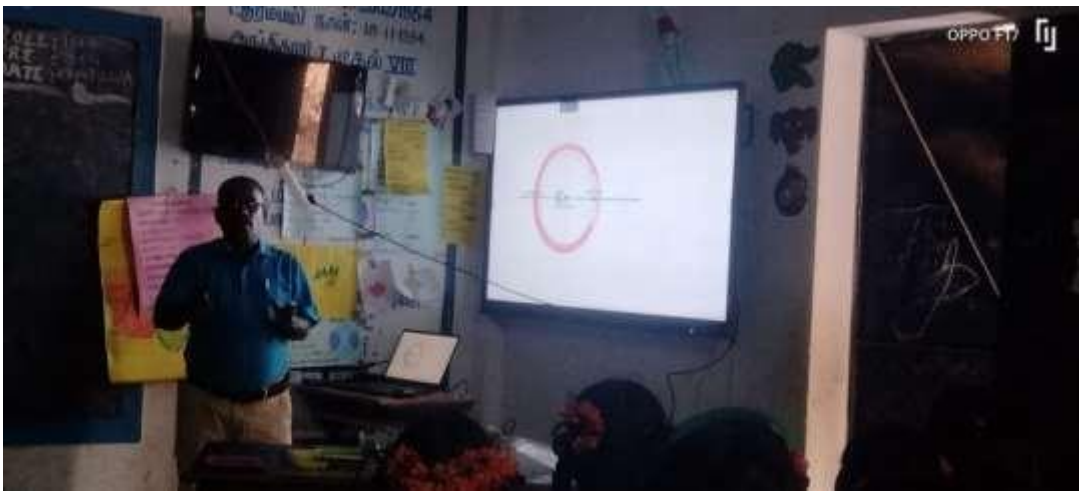
The mirror concept explained with real objects and video mode.

ACTIVITY 3

SPHERICAL MIRRORS (THROUGH MULTIMEDIA)

The image formation in spherical mirrors, we need to know about some of the terms related to them. Center of Curvature, Pole, Radius of Curvature, Principal Axis, Focus and Focal length .The main concepts briefly explained through multimedia.





ACTIVITY 4

IMAGE FORMATION (THROUGH MULTIMEDIA)

Images formed by spherical mirrors are of two types: real image and virtual image. Real images can be formed on a screen, while virtual images cannot be formed on a screen. Image formed by a convex mirror is always erect, virtual and diminished in size. As a result, images formed by these mirrors cannot be projected on a screen.

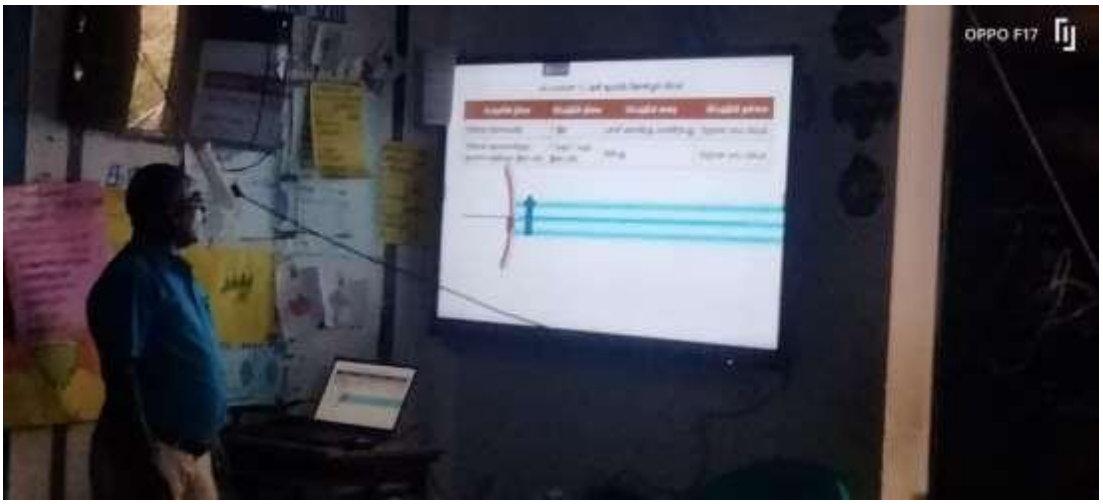


Image formed by a convex mirror and Image formed by a concave mirror can explained with the help of multimedia.

ACTIVITY 5

LAW OF REFLECTION (DEMONSTRATION AND VIDEO MODE)

Reflection involves two rays: incident ray and reflected ray. The incident ray is the light ray in a medium falling on the shiny surface of a reflecting body. After falling on the surface, this ray returns into the same medium. This ray is called the reflected ray. An imaginary line perpendicular to the reflecting surface, at the point of incidence of the light ray, is called the normal.

The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane

The angle of incidence (i) and the angle of reflection (r) are always equal.

Reflection can be classified into two types namely, regular reflection and irregular reflection.

The above concept explained clearly with the help of demonstration cum video mode.

ACTIVITY 6

MULTIPLE REFLECTION AND ITS APPLICATION (DEMONSTRATION AND VIDEO MODE)

In the activity, you observed that for an object kept in between two plane mirrors, which were inclined to each other, you could see many images. This is because, the ‘image’ formed by one mirror acts as an ‘object’ for the other mirror. The image formed by the first mirror acts as an object for the second mirror and the image formed by the second mirror acts as an object for the first mirror. Thus, we have three images of a single body. This is known as multiple reflection.

This type of reflections can be seen in show rooms and saloons.

The multiple reflection and Kaleidoscope device model to made by the students with the help of teacher

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9. DATA ANALYSIS

Analysis and interpretation of data by using appropriate statistical techniques such as descriptive analysis should be adopted.

Table 1

Pre test and post test

Sl .No	Name of the student	Gender	Pre - test	Post - test
1	ARIPRAPHAKARAN.M	MALE	**4**	**9**
2	BHUVANESWARAN.V	MALE	**5**	**10**
3	DEEPAK RENGAN.S	MALE	**4**	**8**
4	DHARUN.M	MALE	**3**	**6**
5	DINESH.K	MALE	**3**	**5**
6	JEEVA.V	MALE	**3**	**7**
7	KALAIYARASAN.M	MALE	**4**	**7**
8	KARTHIKEYAN.M	MALE	**5**	**8**
9	KARTHIKEYAN.P	MALE	**5**	**6**
10	KARTHIKEYAN.S	MALE	**4**	**5**
11	KATHIRAVAN.S	MALE	**6**	**7**
12	MOHANA PRASATH.I	MALE	**6**	**10**
13	NAVEEN.V	MALE	**3**	**5**
14	NAVEENKUMAR.R	MALE	**2**	**4**
15	PALANIYANDI.S	MALE	**5**	**8**
16	PARTHASARATHY.K	MALE	**3**	**6**
17	RENGANATHAN.C	MALE	**4**	**10**
18	SACHIN.B	MALE	**4**	**6**
19	TAMILSELVAN.V	MALE	**4**	**8**
20	THIRUPPATHI.M	MALE	**5**	**9**
21	VASUDEVAN.M	MALE	**4**	**9**
22	VIJAI.T	MALE	**4**	**8**
23	YAGAVARAYAN.V	MALE	**4**	**8**

Sl .No	Name of the student	Gender	Pre - test	Post - test
24	ABIRAMI.N	FEMALE	5	9
25	AKILA.S	FEMALE	4	9
26	AMBIKA.S	FEMALE	4	6
27	DEEPA DHARSHINI.G	FEMALE	5	8
28	DHANALAKSHMI.S	FEMALE	5	7
29	DHANUSHKA.A	FEMALE	4	7
30	DURGA.B	FEMALE	5	9
31	KANIMOZHI.E	FEMALE	6	9
32	KANISHKA.S	FEMALE	5	9
33	KAVIYA.M	FEMALE	4	8
34	KAVIYA.S	FEMALE	5	10
35	MAHALAKSHMI.M	FEMALE	4	9
36	MAHALAKSHMI.V	FEMALE	5	8
37	MANJULADEVI.P	FEMALE	5	9
38	MARIYAYI.S	FEMALE	6	10
39	NALINI.R	FEMALE	5	10
40	NEELA RANI.M	FEMALE	5	9
41	PRITHIKA.S	FEMALE	4	8
42	PRIYANKA.T	FEMALE	3	8
43	RENUGADEVI.K	FEMALE	5	10
44	RUBASHINI.K	FEMALE	7	10
45	SANDHIYA.P	FEMALE	6	9
46	SANGEETHA.S	FEMALE	6	10
47	SASIKALA.A	FEMALE	3	9
48	SUGANTHI.V	FEMALE	5	9
49	VINOTHINI.D	FEMALE	6	9

Table 2

The level of pre and post test understanding the concept of light among VIII standard students

	%
Pre test	35.76%
Post test	64.23%

The above table shows that the post-test level of understanding the concept of light, at 64.23%, is higher than the pre-test level, which is 35.76%, among VIII standard students.

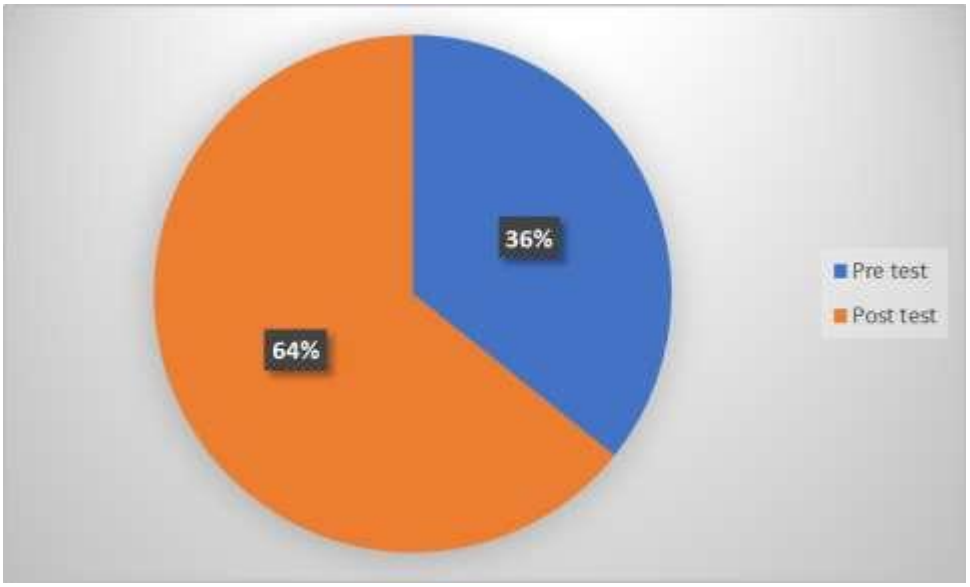


Table 3

There is no significant difference if any between pre and post test of understanding the concept of light among VIII standard students.

	N	Mean	SD	't' test	Level of Significance
Pre test	49	4.51	1.03	13.46	S
Post test	49	8.10	1.55		

Significant at 0.05 level 1.98

The above table shows that the mean score of the post-test for understanding the concept of light is 8.10, which is higher than the mean score of the pre-test, which is 4.51. The calculated 't' value of 13.46 is greater than the table value of 1.98, significant at the 0.05 level. It is concluded that there is a significant difference between the pre-test and post-test scores for understanding the concept of light among VIII standard students.

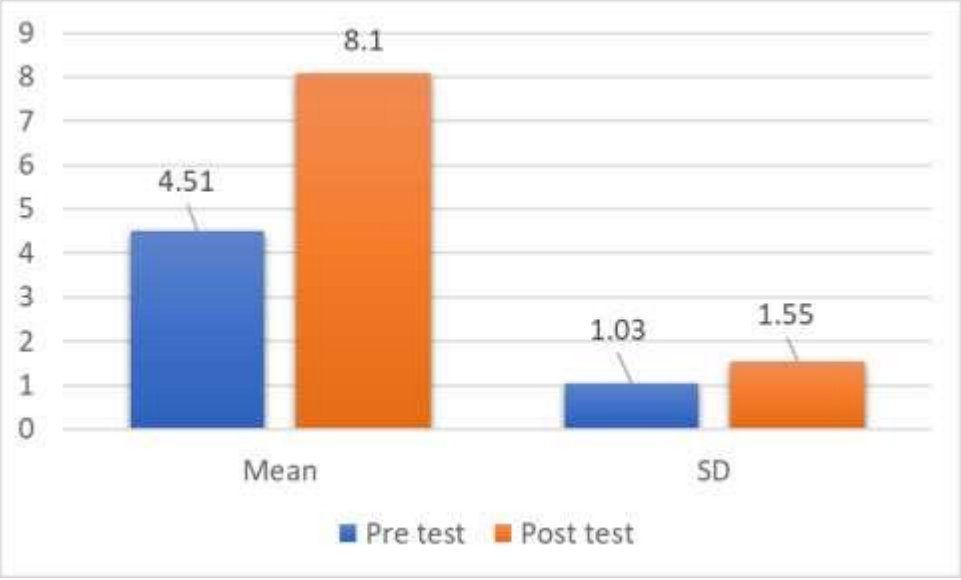


Table 4

There is no significant difference if any between pre test of understanding the concept of light among VIII standard students with respect to gender.

Pre test	N	Mean	SD	't' test	Level of Significance
Male	23	4.08	0.97	2.92	S
Female	26	4.88	0.93		

Significant at 0.05 level 2.01

The above table shows that the mean score of the pretest for females is 4.88, which is greater than the mean score of the pretest for male students, which is 4.08. The calculated 't' value of 2.982 is higher than the table value of 2.01, significant at the 0.05 level. It is concluded that there is a significant difference between the pretest scores for understanding the concept of light among VIII standard students with respect to gender.

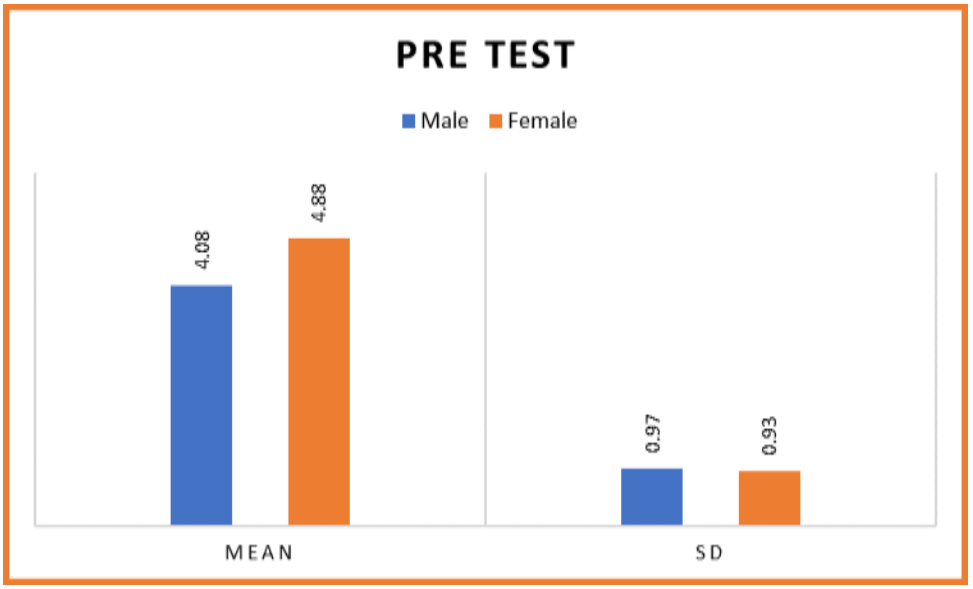


Table 5

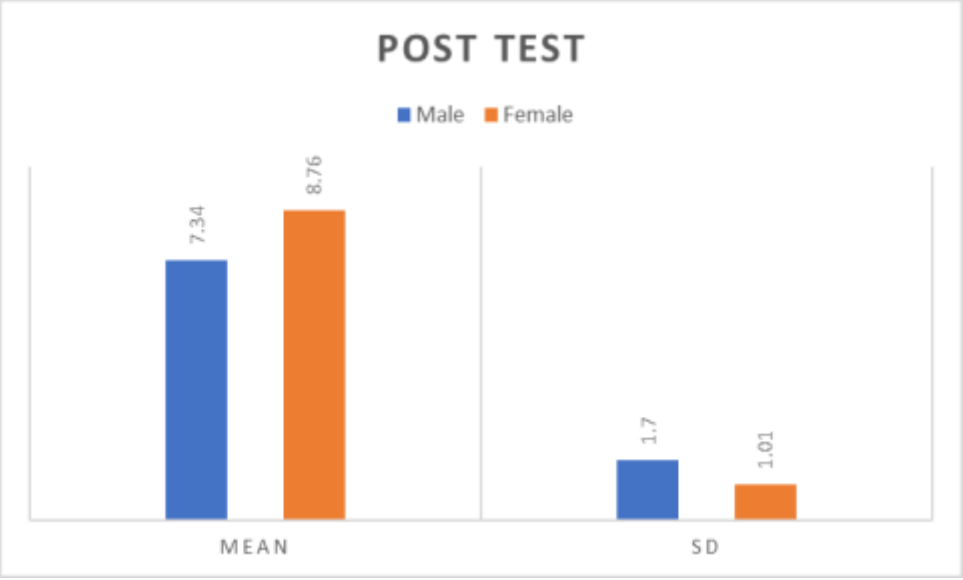
There is no significant difference if any between post test of understanding the concept of light among VIII standard students.

with respect to gender.

Post test	N	Mean	SD	't' test	Level of Significance
Male	23	7.34	1.70	3.59	S
Female	26	8.76	1.01		

Significant at 0.05 level 2.01

The above table shows that the mean score of the post test for females is 8.76, which is greater than the mean score of the post test for male students, which is 7.34. The calculated 't' value of 3.59 is higher than the table value of 2.01, significant at the 0.05 level. It is concluded that there is a significant difference between the post test scores for understanding the concept of light among VIII standard students with respect to gender.



10.FINDINGS

1. The post-test level of understanding the concept of light, at 64.23%, is higher than the pre-test level, which is 35.76%, among VIII standard students.
2. The mean score of the post-test for understanding the concept of light is 8.10, which is higher than the mean score of the pre-test, which is 4.51. There is a significant difference between the pre-test and post-test scores for understanding the concept of light among VIII standard students.
3. The mean score of the pretest for females is 4.88, which is greater than the mean score of the pretest for male students, which is 4.08. There is a significant difference between the pretest scores for understanding the concept of light among VIII standard students with respect to gender.
4. The mean score of the post test for females is 8.76, which is greater than the mean score of the post test for male students, which is 7.34. there is a significant difference between the post test scores for understanding the concept of light among VIII standard students with respect to gender.

11.EDUCATIONAL IMPLICATIONS

1. Enhanced understanding of light principles and phenomena due to interactive multimedia resources.
2. Notable improvement in grasping complex light concepts through engaging multimedia presentations.
3. Significant enhancement in comprehending light properties and behaviors after multimedia interventions.
4. Clear demonstration of understanding light principles, showcasing the effectiveness of multimedia-based learning in facilitating conceptual understanding.

12. CONCLUSION

In conclusion, this study on enhancing the understanding of the concept of light among eighth-grade students through multimedia has demonstrated its potential to significantly improve the learning experience. The integration of multimedia tools proved to be an effective strategy in overcoming traditional teaching limitations and catering to diverse learning styles. The positive outcomes observed in student comprehension and engagement underscore the importance of adapting pedagogical approaches to align with technological advancements. As we move forward in education, the incorporation of multimedia resources should be considered a valuable method for enhancing the effectiveness of science education, ensuring that students not only grasp

complex concepts like light but also develop a broader set of skills that will serve them well in an increasingly digital and interconnected world.

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APPENDIX

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Kd/ gpd NjhT

khzth; ngah; : tFg;G : VIII

gs;spapd; Kfthp : 10x1=10

midjJ tpdhffSfFk tpilasp

1. xU Nfhsf Mbapd Fopej guggpy xsp vjpnuhspgG epfo;e;jhy mJ ---------- vd miof;fg;gLfpwJ.

m) Ftp Mb M) Fop Mb ,) rkjs Mb

2. KjyhtJ gutisa Mbia tbtikjjth;

m) n`d;wp n`h;l] M) ilNahfs] ,) ikf;fyrd]

3.moF epiyaq;fspy; myq;fhuk nraa gad;gLk; Nfhsf Mb ----------

M) rkjs Mb M) Ftp Mb ,) Fop Mb

4. thfdqfspy; gpd fhl;rp Mbahfg; gadgLjjg;gLk Mb

m) Ftp Mb M) Fop Mb ,) rkjs Mb

5. xspf;fjph; xd;wpd; gLNfhz kjpgG 30^0 vdpy vjpnuhspgG Nfhzjjpd kjpgG

m) 45^0 M) 60^0 ,) 30^0

6. Mb ikajijAk tisT ikajijAk ,izf;Fk Neh;f;NfhL--------- vdggLk.

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7. ePh%o;fp fg;gyfis topeljJtjw;F ----------gadgLfpwJ

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8. xyptpyfYf;fhd]neytpj

m) $\mu = \frac{\sin r}{\sin i}$ M) $\mu = \frac{\sin i}{\sin r}$,) $\mu = \sin i \times \sin r$

9. ntsnshspf; fjphpd; epwg;gphpiff;F ---------- xU cjhuzk

m) thdtpy; M) fpufzk ,) elrjjpuk

10. ,J xspapd; gdKf vjpnuhspgG jjJtjjpdgb cUthffg;gllJ

m) nghp];Nfhg M) fiylh]Nfhg; ,) rpdpkh]Nfhg;

PRE TEST

ACTIVITY

INVESTICATOR EXPLAINED THROUGH VIDEO MODE

STUDENTS ACTIVITY

DEMONSTRATION BY THE INVESTIGATOR

STUDENTS ACTIVITY

STUDENTS AND CO - INVESTIGATOR WATCHING VIDEO MODE

POST TEST

HONOUR THE STUDENTS