Removing the obstacles in understanding the structure and functions of cell and cell components among upper primary students through Word Wall

Investigator
G. Thanalakshmi,
Senior Lecturer

Action Research

Submitted to

State Council of Educational Research and Training,
Chennai – 600 006.

March – 2024

District Institute of Education and Training,
Palayampatti – 626112, Virudhunagar District.

Acknowledgement

This action research journey has been a testament to the power of collaboration. I am deeply grateful to the Director, SCERT, for providing the opportunity to embark on this exploration.

I'd like to register my sincere and special thanks to Dr P. Selvi, Principal, DIET, Palayampatti, for her unwavering encouragement and motivation all through this action research.

The enthusiastic participation of the Head Mistress, teachers, and students of Municipal Middle School, Vellakarai Road, Sattur, was truly inspiring. Their willingness to learn and grow together fuelled my passion for this project. Finally, I extend my appreciation to the faculty of DIET whose support, both direct and indirect, helped bring this research to fruition.

Together, we embarked on a quest to unlock new possibilities. The journey continues!

Declaration

This action research, titled **"Removing the obstacles in understanding the structure and functions of cell and cell components among Upper Primary Students through Word Wall,"** details the work I conducted at Municipal Middle School, Vellakarai Road, Sattur, Virudhunagar District, during the academic year 2023-2024. The action research was submitted to the SCERT, Chennai.

Place : Palayampatti

Date :

Dr G. Thanalakhmi

Senior Lecturer, DIET Palayampatti

Virudhunagar District.

CONTENT

I. Title

Removing the obstacles in understanding the structure and functions of cell and cell components among upper primary students through Word Wall.

II. Introduction

Understanding cells, the fundamental units of life, is a cornerstone of biological literacy. Yet, grasping these intricate concepts can be challenging for upper primary students. This action research investigates the effectiveness of a Word Wall, a readily accessible visual and textual reference system, in overcoming these obstacles and facilitating students' comprehension of cell structure and function. The research explores whether a Word Wall can bridge the gap between complex scientific vocabulary and student understanding. By offering a dynamic and interactive learning tool, the investigator hopes to demonstrate the Word Wall's potential to improve student learning outcomes in cell biology at the upper primary level. This investigation has the potential to yield valuable insights for optimizing pedagogical strategies and fostering a deeper understanding of the fascinating world within our cells.

What is a word wall?

According to Patricia Cunningham (2012), a pioneer in vocabulary development, a word wall is not just a display of words, but a curated selection of important terms relevant to the subject matter being studied.

In the context of this action research project, a word wall can be a crucial pedagogical tool to address the challenges faced by upper primary students in grasping the abstract concepts of cell structure and function. This strategically designed word wall will showcase key terms and definitions related to cell biology, accompanied by visual aids such as pictures, diagrams, or models to cater to different learning styles and promote a deeper understanding of the subject matter.

Additionally, the interactive aspects of the word wall, such as movable cards or games, can foster student engagement and encourage independent exploration of key concepts. This active involvement strengthens students' vocabulary acquisition and retention, ultimately leading to a comprehensive understanding of cell biology.

What does the word wall signify?

A word wall is a visible display in a classroom that features a collection of words students are studying. These words can focus on high-frequency words, word study examples, academic language, and terms introduced in specific content areas like science or history. Word walls support students in various ways, including developing phonics, spelling, vocabulary, comprehension, and writing skills. They also act as a reference tool, fostering independence in learners. For instance, a science word wall might display terms like "photosynthesis," "habitat," and "evolution" with accompanying definitions or visuals to reinforce understanding.

Key features of a word wall

Targeted Vocabulary: The word wall showcases a curated selection of important terms relevant to the current curriculum, thematic unit, or students' grade level. These terms can include:

High-frequency sight words for younger readers.

General vocabulary words that enhance overall language development.

Subject-specific vocabulary related to science, history, or other content areas.

Organization: Words on a word wall can be organized in different ways to best suit the learning objectives and student needs. Here are the common methods:

- Alphabetical: This is a familiar system for students who are comfortable with the alphabet. It allows for quick look-ups of specific words.

- Categorical: Grouping words by category (e.g., verbs, nouns, synonyms, antonyms, science terms) helps students understand relationships between words and build vocabulary knowledge.
- Thematic: Organizing words around a specific theme (e.g., characters in a book, parts of the solar system, types of weather) can be helpful for thematic units or projects.

Visual Aids: Word walls often incorporate visual aids alongside the words. These visuals, such as pictures, illustrations, or diagrams, can significantly enhance understanding for all learners, regardless of age or language proficiency. They create a stronger connection between the word and its meaning.

Interactive Elements: To boost student engagement, some teachers incorporate interactive features on the word wall. These might include movable cards or pockets that facilitate activities like matching definitions to terms, sorting words by category, or creating sentences using the vocabulary. This active participation deepens student understanding and retention.

Reference Tool: The word wall serves as a reference tool to support students' reading, writing, and spelling. It provides a visual reminder of words they have learned or are currently studying.

Why use word walls?

Word walls offer a multitude of benefits for students, fostering a stronger foundation in language and content knowledge. Here are some key advantages:

Enhanced Reference: They serve as a constant visual reference for students, providing easy access to high-frequency words, vocabulary terms, and even pictures to support understanding.

Pattern Recognition: Word walls help students develop critical thinking skills by enabling them to see patterns and relationships between words. This can

involve identifying word families, prefixes and suffixes, or synonyms and antonyms.

Vocabulary Development: By showcasing vocabulary related to classroom reading and specific content areas like science or history, word walls actively support vocabulary acquisition. Students are exposed to new terms repeatedly, reinforcing their meaning and usage.

Independent Learning: Word walls empower students to become more independent learners. During reading and writing activities, they can readily access the displayed words for reference, reducing reliance on teacher assistance.

Using interactive word walls in science

Science is a subject brimming with new and often complex vocabulary. Mastering these terms is crucial for students to grasp concepts, make connections between ideas, and ultimately excel in science. Traditional word walls can be helpful, but interactive word walls take engagement to a whole new level. By allowing students to physically interact with the vocabulary, they are more likely to remember it and see the relationships between different concepts.

The possibilities for interactive activities with a science word wall are vast, limited only by your imagination. Here are a few examples that cater to different learning styles:

1. Categorization and Sequencing Challenge:

Activity: Students categorize vocabulary words related to biological organization (e.g., cell, organ, organism) or any other relevant topic. This can be done individually or in groups.

Interactive Element: Students have to justify their placements on the wall or on a separate workspace, sparking discussions and critical thinking about the hierarchy of concepts.

2. Building Connections:

Activity: For a more kinaesthetic activity, students can remove words from the wall and physically arrange them to show relationships between the terms.

Interactive Element: The class can then discuss and collaboratively build a summarizing statement on a large piece of chart paper, like "Cells are the building blocks of tissues, which in turn form organs." This reinforces the connections between the vocabulary words.

Multiple exposures

Maximizing Learning Through Repeated Exposure: In schools, various Information, Education, and Communication (IEC) materials like alphabet charts, health posters, and learning objective charts adorn the walls. These visuals serve a valuable purpose by providing students with repeated exposure to important information. This consistent exposure, particularly beneficial in primary and upper primary grades, aids in memory retention and knowledge absorption.

The Power of Repetition: Research supports the idea that deep learning is fostered through multiple, spaced interactions with new knowledge and concepts. Spaced practice, achieved by revisiting information over several days and employing different activities, strengthens understanding and promotes long-term memory.

III. Background of the study

The difficulty level of the concepts in teaching and learning of cell and cell components was brought into notice and observed during school visit. Also the classroom observations made by the investigator helped to recognize the problem. Cells are the basic structure of all living organisms. Cells provide structure for the body, take in nutrients from food and carryout important functions. While understanding how life functions at the cellular

level is fundamental to biology, research indicates that upper primary students often encounter difficulties grasping the concepts of cell structure and components. This complexity arises from the abstract nature of these concepts, coupled with unfamiliar scientific vocabulary. Recognizing this challenge during a school visit and subsequent classroom observations, this action research focuses on exploring the effectiveness of implementing a "Word Wall" as a pedagogical tool to enhance upper primary students' understanding of cell structure and function. Hence the investigator planned to incorporate suitable instructional strategy like word walls to understand the structure and functions of cell and cell components among upper primary students. So the investigator selected this topic for the action research.

A Word Wall is a visual display of key terms and definitions, providing a readily accessible reference point for students. It has the potential to improve vocabulary acquisition, enhance visual memory, and promote independent learning by reinforcing key. The inclusion of a specifically designed Word Wall for cell biology aimed to bridge the gap in comprehension for students and facilitate a deeper understanding of this crucial subject matter.

IV. Objectives of the study

- To determine if the implementation of a Word Wall positively impacts upper primary students' understanding of cell structure and function as measured by pre- and post-intervention assessments.
- To identify specific cell-related concepts where the Word Wall demonstrably improves student comprehension compared to traditional teaching methods, through qualitative analysis of student work or interviews.
- To investigate the impact of the Word Wall on students' vocabulary acquisition in cell biology, utilizing pre- and post-intervention vocabulary quizzes or assessments.

- To assess the effectiveness of the Word Wall in enhancing students' retention of information related to cell structure and function through delayed post-intervention assessments or recall tasks.
- To explore the potential of the Word Wall to facilitate the development of problem-solving skills in cell biology through the analysis of student performance on tasks requiring application of knowledge beyond basic definitions.

V. Probable Causes of the Problem

1. **Abstract nature of cell structure and function:** The concepts of cells and their components are inherently abstract and difficult for students to visualize. This makes it challenging for them to connect these concepts to their prior knowledge and real-world experiences.
2. **Limited prior knowledge and vocabulary:** Students at the upper primary level might lack the foundational knowledge in biology and the necessary scientific vocabulary to fully grasp the intricacies of cell structure and function.
3. **Ineffective teaching methods:** Traditional methods like lecture-based or reading-and-explaining approaches might fail to engage students and provide them with opportunities for active learning and deeper understanding.
4. **Lack of visual aids and engagement strategies:** The absence of engaging and interactive learning materials like models, diagrams, or simulations can hinder student understanding and make the learning process less stimulating.
5. **Limited opportunities for independent learning and practice:** Students might not have sufficient opportunities to explore concepts independently, practice applying their knowledge, and receive timely feedback to solidify their understanding.

VI. Probable Solutions

- Use manipulatives like lattoo and flowers to demonstrate the concept of cells and their components in a motivating way.
- Develop or revamp student booklets to be visually appealing and informative. Include colorful illustrations and diagrams alongside the text to enhance understanding.
- Collaboratively create a bulleted list of cell structures and components in class. This will allow students to participate actively and contribute their understanding.
- Instead of rote memorization, use engaging games or activities to reinforce student understanding of cell components. This could involve matching games, puzzles, or creating models of cells.
- Engage students in a cell component role-playing activity. Students can act out the functions of different organelles within a cell, demonstrating how they work together.
- In the context of this action research project, a **Word Wall** serves as a crucial pedagogical tool specifically designed to address the challenges faced by upper primary students in grasping the abstract concepts of cell structure and function. This strategically designed Word Wall will showcase key terms and definitions related to cell biology, accompanied by visual aids such as pictures, diagrams, or models. This format provides multiple access points for learning, catering to diverse learning styles and promoting a deeper understanding of the subject matter. Science word walls can stimulate student interest in the subject and provide a visual reference for key terms.

VII. Action Hypothesis

Upper Primary students of Municipal Middle School, Vellakarai Road, Sattur, who are exposed to a Word Wall intervention will demonstrate a statistically significant improvement in their understanding of cell structure and function compared to students who receive traditional instruction, as measured by pre- and post-intervention assessments focused on key cell-related concepts.

VIII. Methodology

a. Target

All the Upper Primary students of Municipal Middle School, Vellakarai Road, Sattur.

b. Tools

PreTest & Post Test Questionnaire containing 30 objective type questions in the form of choose the correct answers (10) fill in the blanks (5) true or false (5) matching the correct answers (5) and label the parts (5). To maintain the objectivity of the questions all the questions were in objective form.

Procedure

Phase I

The investigator administered a pre-test to 16 upper primary students from Municipal Middle School, Vellakarai Road, Sattur. The pre-test used a question paper included in the annexure. Each correct answer received one mark, with a maximum possible score of 30.

The investigator analysed the scores obtained by the pupils from the pre-test. This analysis, in collaboration with the practicing teacher, involved error analysis to identify the reasons behind student mistakes. Discussions with the teacher focused on these reasons and the development of appropriate remedial activities to address the identified learning gaps. A pre-test, was administered before the Word

Wall intervention to assess students' initial understanding of cell structure and function. This established a baseline for comparison with the results of a post-test administered after the intervention. This comparison would help gauge the effectiveness of the Word Wall strategy in improving student learning.

Phase II

Sixteen students were actively engaged in a variety of activities to overcome challenges in understanding cell structure and functions of cell components.

Execution of Intervention

The investigator had adopted the following steps in the action research.

1. Consultation: The investigator met with the Headmaster and relevant science teacher at the selected school to discuss the action research, obtain permission to conduct the research, and gain their insights into the students' challenges in understanding the complex concepts of cell structure and function.

2. Needs Assessment: Developed appropriate assessment items (e.g., pre-test) to determine students' baseline understanding of the concepts of cell structure and function.

3. Pre-test: Administered the pre-test to the selected upper primary students to assess their initial understanding of the target concepts.

4. Data Analysis: Analyzed the pre-test data to identify specific strengths, weaknesses, and areas for improvement in students' understanding of cell structure and function.

5. Intervention Design: Based on the data analysis, designed and planned targeted interventions focusing on the identified areas for improvement.

6. Intervention Implementation: Implemented the planned interventions with fidelity, ensuring consistency and student engagement.

7. Post-test: Administered a similar assessment (post-test) to the students after the intervention period to measure their learning progress.

8. Data Analysis: Analyzed the post-test data and compared it with the pre-test data to evaluate the effectiveness of the intervention.

9. Reporting: Presented the findings of the research to stakeholders, including teachers, the principal, and potentially students and their parents, highlighting the impact of the intervention and the potential implications for improving students' understanding of cell structure and function.

Intervention

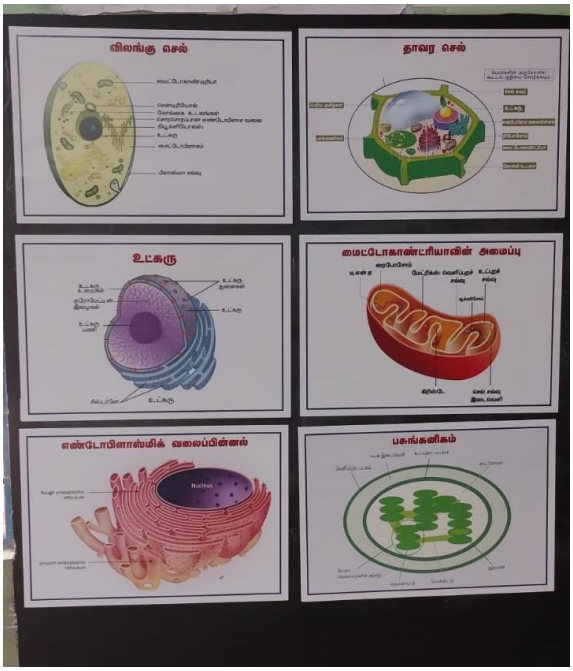
Building Blocks of Life: Cultivating Student Curiosity in Biology through Cell Exploration

This action research aimed to cultivate student interest in biology, particularly the captivating field of cell biology. The investigator employed a multi-faceted approach to achieve this goal. First, students were introduced to various examples of prokaryotic and eukaryotic cells, providing a foundation for understanding the fundamental building blocks of life. Next, captivating visuals showcasing unicellular and multicellular organisms served as a bridge between these building blocks and the diverse forms of life. Finally, we emphasized the overarching concept that all living things, from the simplest to the most complex, share a common composition: cells. By understanding these microscopic units, students can gain insight into the fundamental processes of life, including how organisms grow, develop, and ultimately reach their end.

2. Unlocking the Secrets of the Cell: Interactive Booklets Spark Curiosity

The investigator meticulously prepared a set of informative booklets to enhance student understanding of the fascinating world within a cell. Each booklet, designed for easy reference, featured a unique layout. One side of each page served as a visual window, showcasing a high-quality image of a specific cell organelle. These vibrant images, perhaps depicting the intricate folds of the endoplasmic reticulum or the powerhouse mitochondria, brought the tiny structures to life. Flipping the page revealed a treasure trove of information on the facing side. Here, clear and concise text explained the vital functions of each organelle. Students could learn how the Golgi apparatus acted as a cellular packaging center or how ribosomes, the protein factories, tirelessly churned out essential building blocks. These booklets, combining captivating visuals with informative explanations, aimed to provide students with a solid foundation for exploring the intricate workings of the cell.

3. Walls that Teach: A Visual Journey into the Cell



To ignite student curiosity about the intricate workings of living things, the classroom walls were transformed into vibrant learning landscapes. Picture charts showcasing plant cells, animal cells, and their diverse organelles adorned the walls. These weren't just ordinary charts; they were crafted to be visually captivating and boldly informative. Eye-catching colours and clear illustrations drew students in, while concise explanations of cellular functions provided bite-sized bursts of knowledge. This immersive environment ensured that the essential information about cells was constantly within sight. By strategically placing the charts in student "prone areas" – spaces they frequented regularly – the information became embedded through everyday exposure. As students walked by, engaged in conversation, or simply glanced around the room, they were subconsciously absorbing the information. This passive learning approach complemented classroom instruction and fostered a sense of familiarity with these microscopic marvels. Like a visual feast, these charts served a dual purpose: engaging students' interest and solidifying their understanding of cell biology. The constant visual reminders not only refreshed students' memory but also

provided a springboard for further exploration and questioning. By actively engaging with the information in these visually compelling charts, students could solidify their understanding and develop a deeper appreciation for the fascinating world within a cell.

4. **Beyond the Lecture: A Multifaceted Approach to Cell Biology Mastery**

To reinforce student comprehension of cell structure and function, an engaging self-study activity was introduced. Students were encouraged to record at their own pace the names of various cellular organelles, along with the key differences between plant and animal cells, and their respective functions. This self-directed approach offered several advantages:

Accessibility: Students were able to practice at their own convenience, allowing individuals with varying learning styles to thrive.

Active recall: The act of dictating information actively engages the brain, enhancing memory retention compared to passive reading or listening.

Repetition: By repeating the information in their own words, students reinforced their understanding and solidified their knowledge base.

Long-term memory: The combination of active recall and repetition fosters long-term information retention, making the crucial details about cell structure and function less likely to be forgotten. This approach empowered students to take ownership of their learning and fostered deeper comprehension of the fundamental building blocks of life.

5. Organelle Nicknames: Learning Cell Biology

Each student is assigned a specific cell organelle (e.g., nucleus, cytoplasm, cell wall, cell membrane, mitochondria, lysosome, Golgi apparatus, endoplasmic reticulum, chloroplast, vacuole). The other students call using the 'nicknames'. By uttering the words again and again they easily memorize the words. Care should be taken by the teachers that their names does not affect any students.

6. The Cell Comes Alive: Role-Playing and Research Illuminate Organelle Functions

To foster an engaging learning experience about cell organelles, the classroom was transformed into a stage for diverse role-playing activities. Students were assigned specific organelles, delving into their functions through research using credible scientific resources. Embracing creativity, students presented their findings in unique formats:

Skits: Students collaborated to write and perform short theatrical pieces depicting the interactions and functions of organelles within a cell.

Riddles: Students crafted riddles about their assigned organelles, challenging their peers to identify them based on clever clues related to their functions.

Mono acts: Individual students took center stage, delivering informative monologues from the perspective of their assigned organelle, highlighting its role in cell life.

Debates: Students engaged in friendly debates, each team representing different organelles and arguing their case for being the "most essential" to the cell's survival.

A key element adding to the immersive experience was the utilization of colourful and informative placards. Each placard prominently displayed the name of the assigned organelle in bold, capital letters. On the backside, clear and concise descriptions of the organelle's function were presented in easily readable fonts. These placards served multiple purposes:

Easy identification: The placards helped the audience quickly identify which organelle each student was representing.

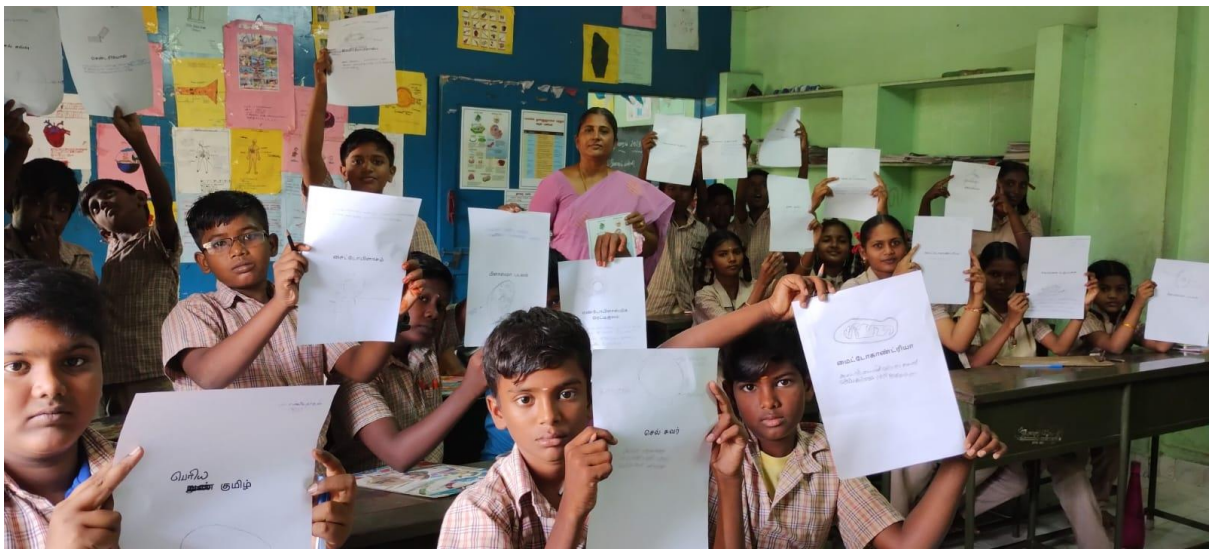
Visual reinforcement: Vibrant colors and clear text complemented the students' presentations and enhanced understanding.

Collaborative tool: Students could refer back to the placards during their performances for reference and to ensure accuracy.

By repeating these engaging activities over time, students were able to solidify their understanding of cell organelles and their diverse functions. The combination of active participation, creative expression, and visual aids provided a memorable and impactful learning experience.

7. **Beyond the Lecture: Fostering Student Engagement and Measuring Understanding**

Following each activity, the investigator administered a worksheet to assess students' understanding. Despite this assessment component, students participated enthusiastically and enjoyed the activities.



.

Phase III

To assess the impact of the Word Wall intervention on students' understanding of cell structure and function, a post-test was administered following the intervention period. This post-test utilized the same questionnaire employed in the pre-test, ensuring consistency in measurement.

IX. Data Analysis

To assess the effectiveness of the Word Wall intervention, data was collected through pre- and post-tests. These questionnaires evaluated the students' understanding of cell structure and function.

The information gathered from the tests was analysed by comparing the average scores of the 16 students on both the pre-test and the post-test. This comparison helped determine if the students' understanding of cell structure and function improved after participating in the Word Wall activities.

Statistical Techniques Applied

The following statistical techniques were used for analysing the collected data in the form of pre-tests and post-tests.

Percentage Analysis

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

Arithmetic Mean

The researcher has made the following formula for calculating arithmetic mean.

$$X = \frac{\sum x}{N}$$

Where X = Arithmetic mean

$\sum$ = Sum of

X = Scores of distributions

N = Number of score.

Table I

Distribution of the Pre-test and Post test scores of Class 6

Sl. No	Class	Pre test marks in percentage (X)	Post test marks in percentage (Y)	Difference (X-Y)
1	VI	9.5	21	11.5
2	VI	10	22	12
3	VI	07	20	13
4	VI	07	21	14
5	VI	01	09	08

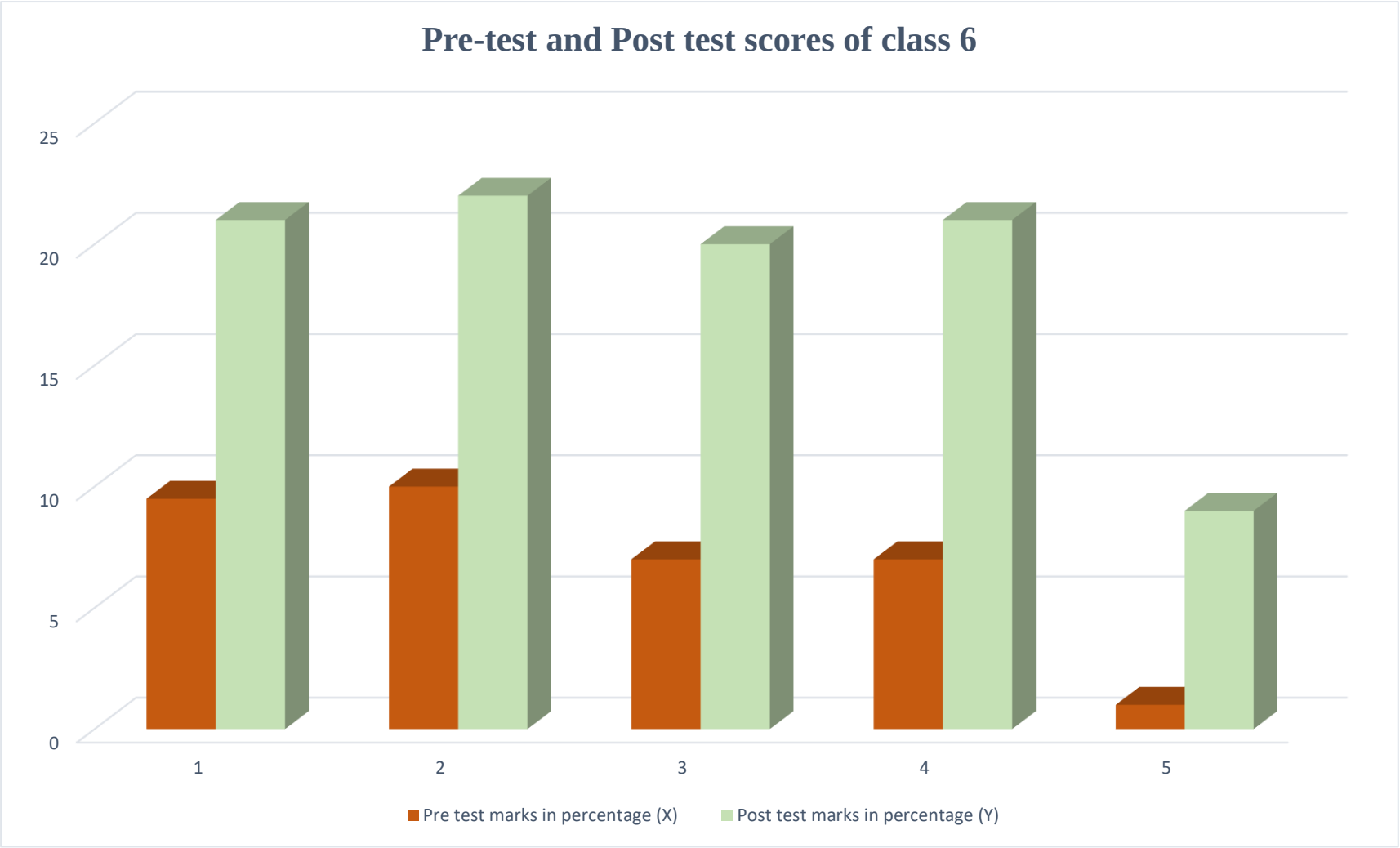

Pre-test and Post test scores of class 6
25
20
15
10
5
0
1
2
3
4
5
Pre test marks in percentage (X)
Post test marks in percentage (Y)

Table II

Pre test – Post test Mean Comparison of Class 6

Test	Number of Students	Mean
Pre	05	32.9
Post	05	62

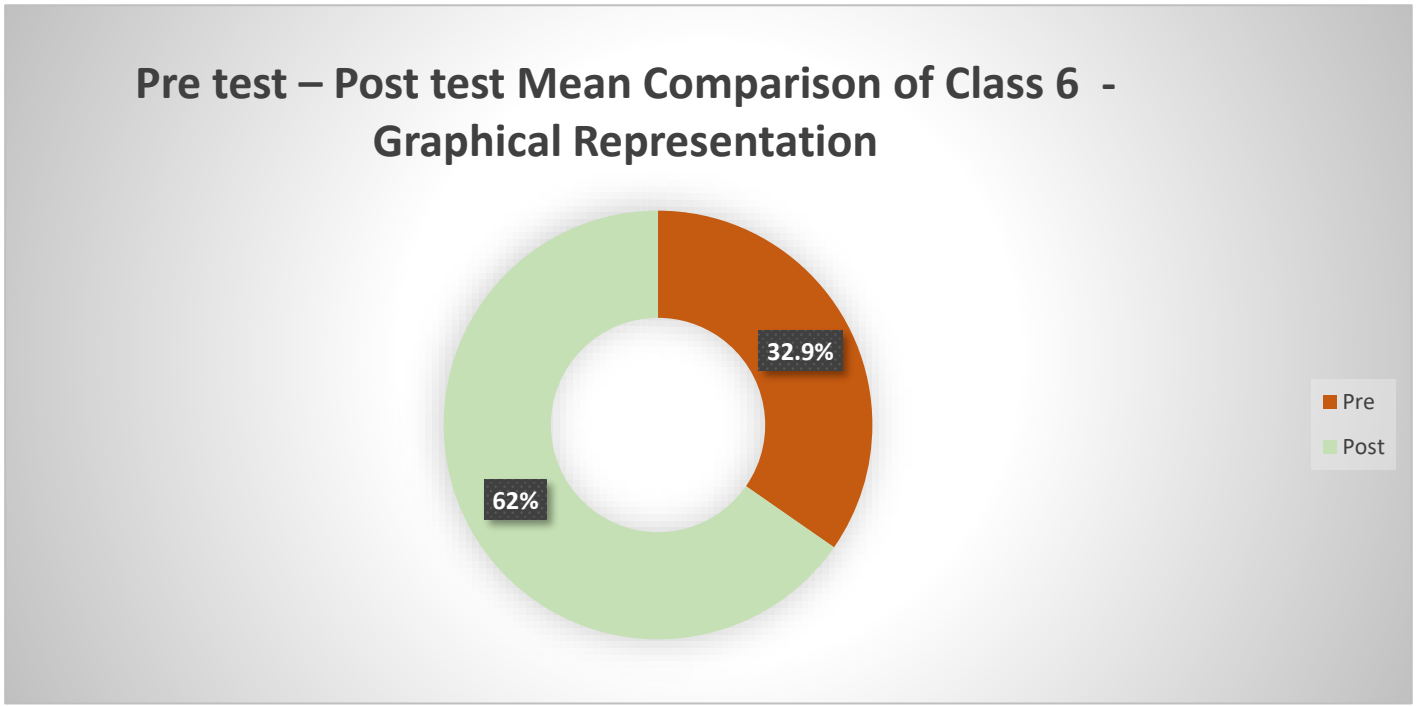


Table III

Distribution of the Pre-test and Post test scores of Class 7

Sl. No	Class	Pre test marks in percentage (X)	Post test marks in percentage (Y)	Difference (X-Y)
1	VII	9.5	25	15.5
2	VII	11	26	15
3	VII	07	25	18
4	VII	19	30	11
5	VII	19.5	30	10.5
6	VII	09	22	13

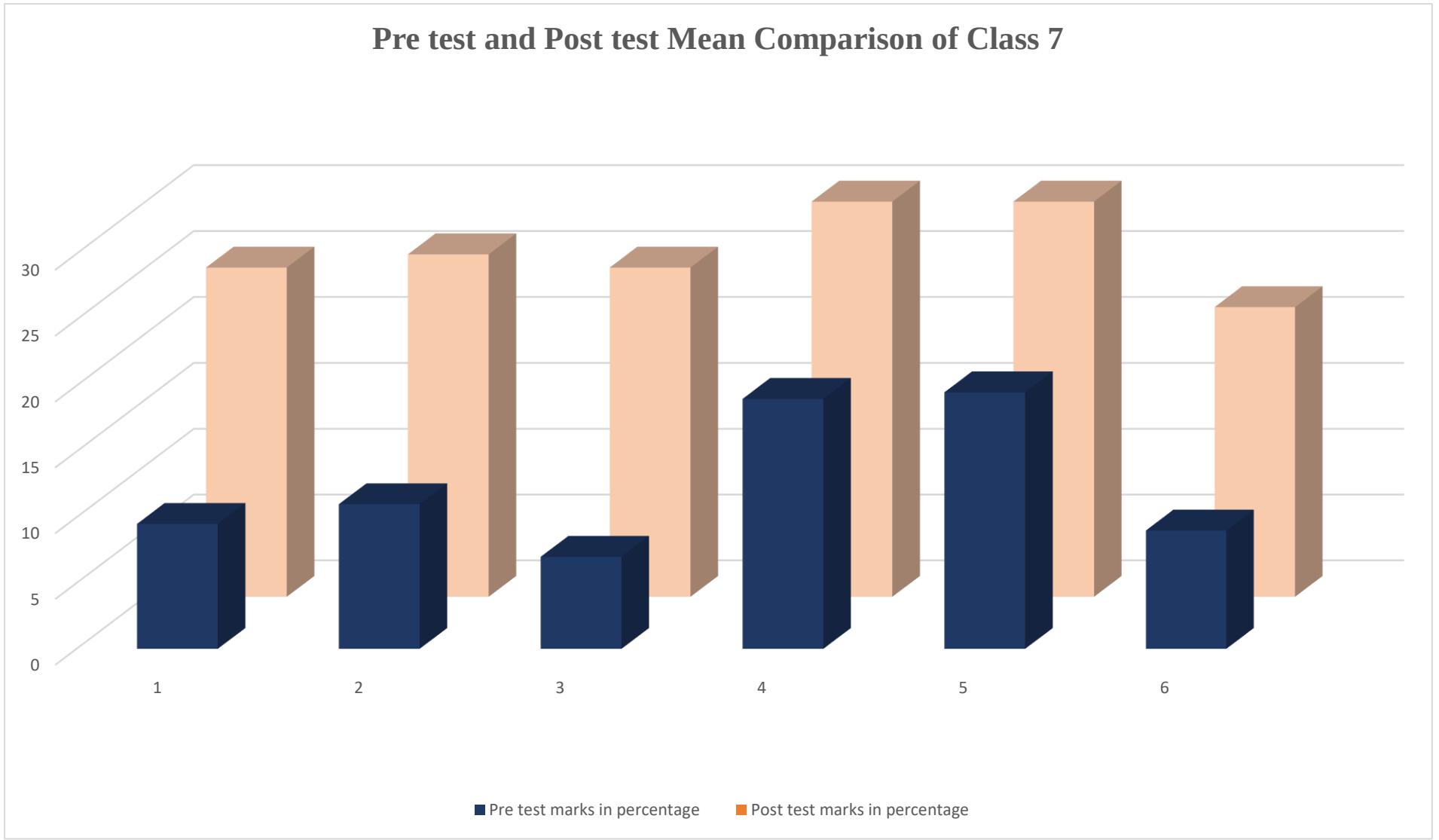

Pre test and Post test Mean Comparison of Class 7
30
25
20
15
10
5
0
1
2
3
4
5
6
Pre test marks in percentage
Post test marks in percentage

Table IV

Pre test – Post test Mean Comparison of Class 7

Test	Number of Students	Mean
Pre	06	41.7
Post	06	87.8

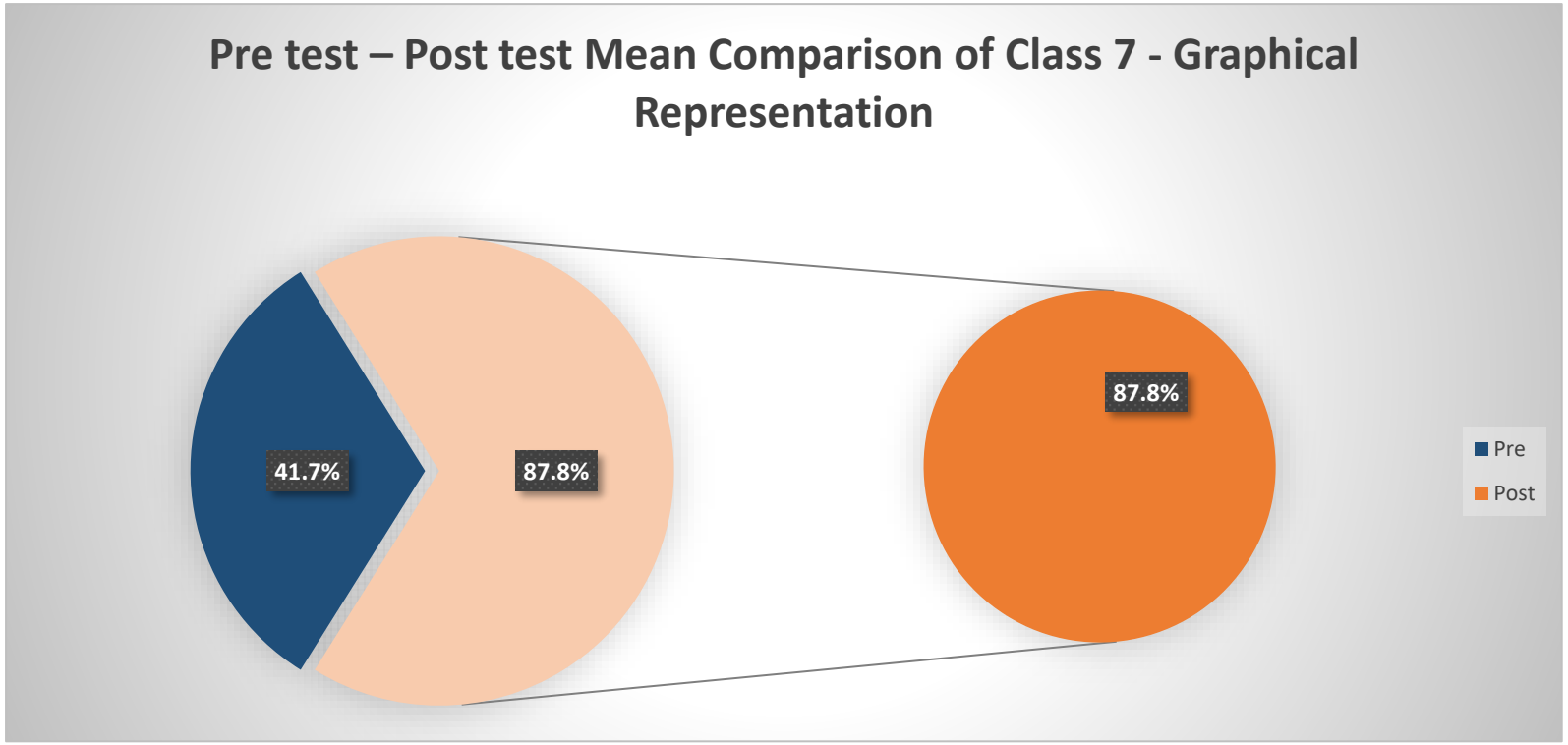


Table V

Distribution of the Pre-test and Post test scores of Class 8

Sl. No	Class	Pre test marks in percentage (X)	Post test marks in percentage (Y)	Difference (X-Y)
1	VIII	05	18	13
2	VIII	05	19	14
3	VIII	10	23	13
4	VIII	04	16	12
5	VIII	12	26	14

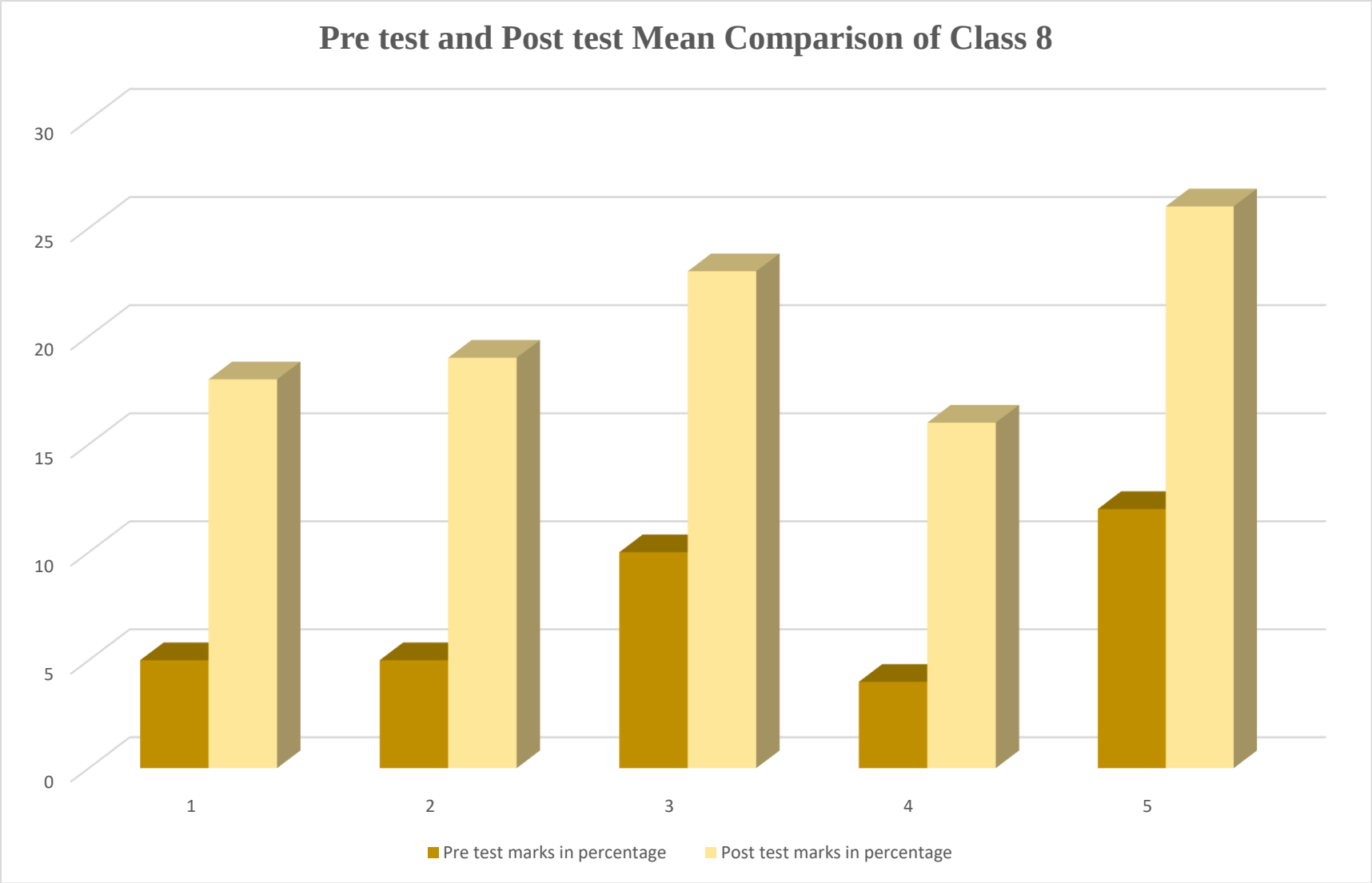

Pre test and Post test Mean Comparison of Class 8
30
25
20
15
10
5
0
1
2
3
4
5
Pre test marks in percentage
Post test marks in percentage

Table VI

Pre test – Post test Mean Comparison of Class 8

Test	Number of Students	Mean
Pre	05	24
Post	05	68

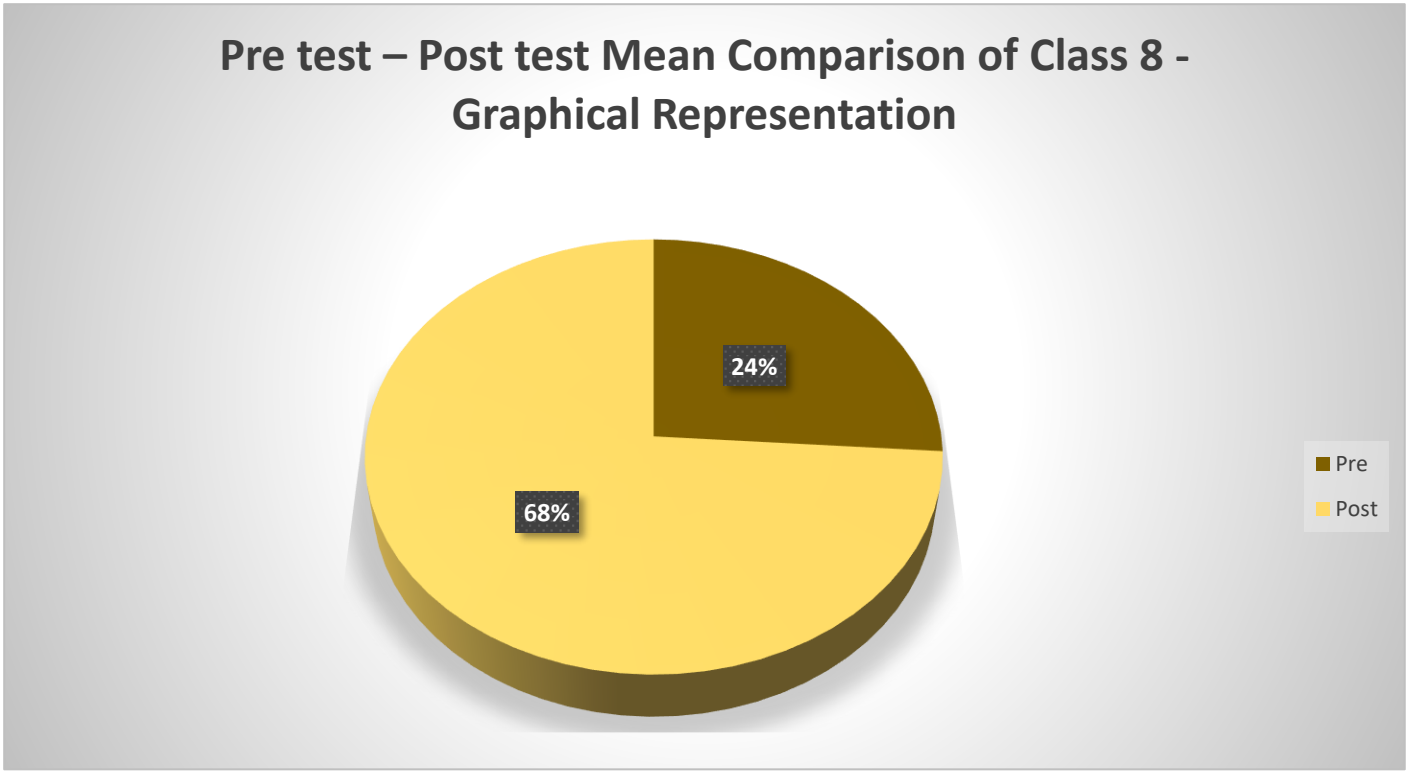


Table VII

Distribution of the Pre-test and Post test scores of the Overall sample

Sl. No	Class	Pre test marks in percentage (X)	Post test marks in percentage (Y)	Difference (X-Y)
1	VI	9.5	21	11.5
2	VI	10	22	12
3	VI	07	20	13
4	VI	07	21	14
5	VI	01	09	08
6	VII	9.5	25	15.5
7	VII	11	26	15
8	VII	07	25	18
9	VII	19	30	11
10	VII	19.5	30	10.5
11	VII	09	22	13
12	VIII	05	18	13
13	VIII	05	19	14
14	VIII	10	23	13
15	VIII	04	16	12
16	VIII	12	26	14

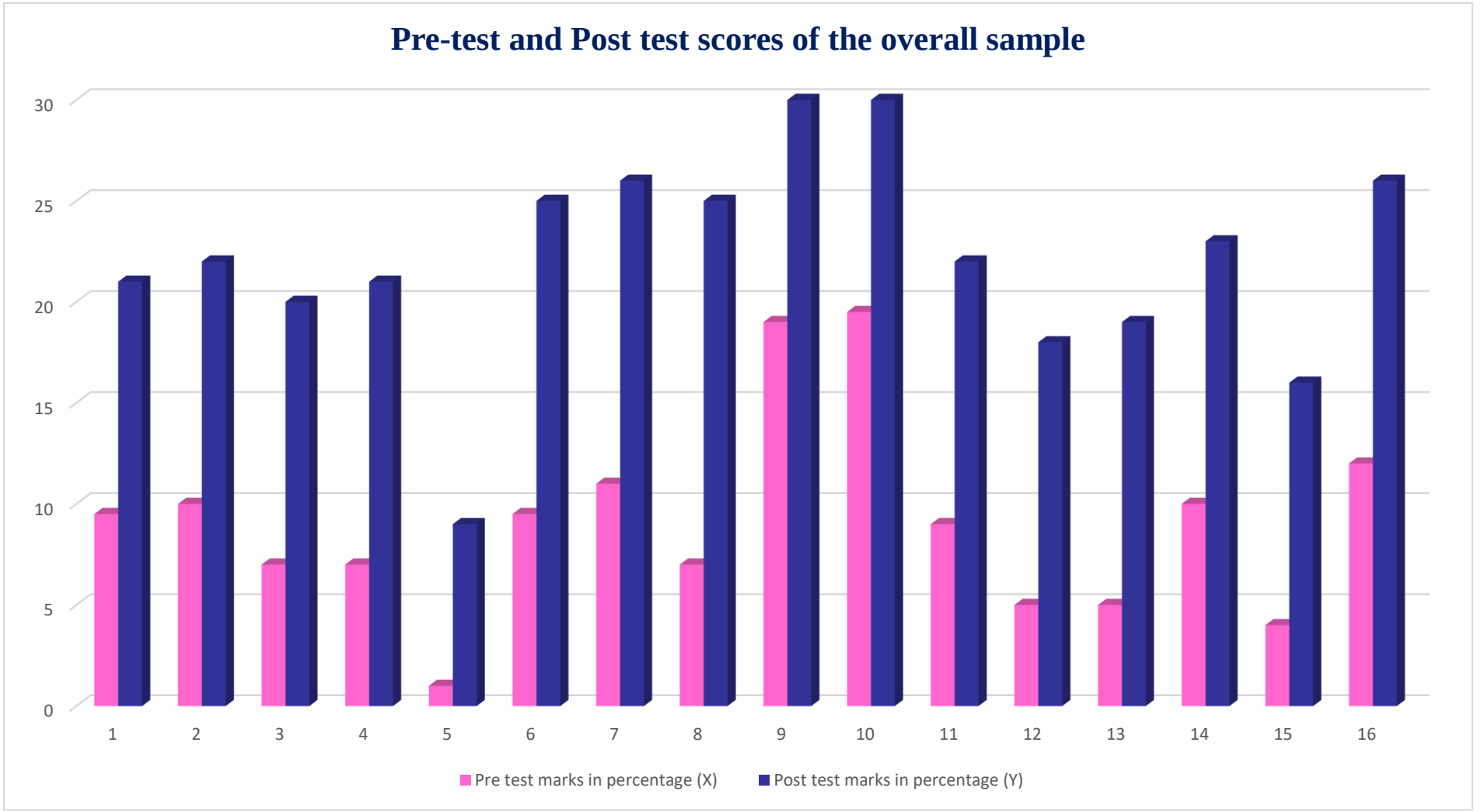
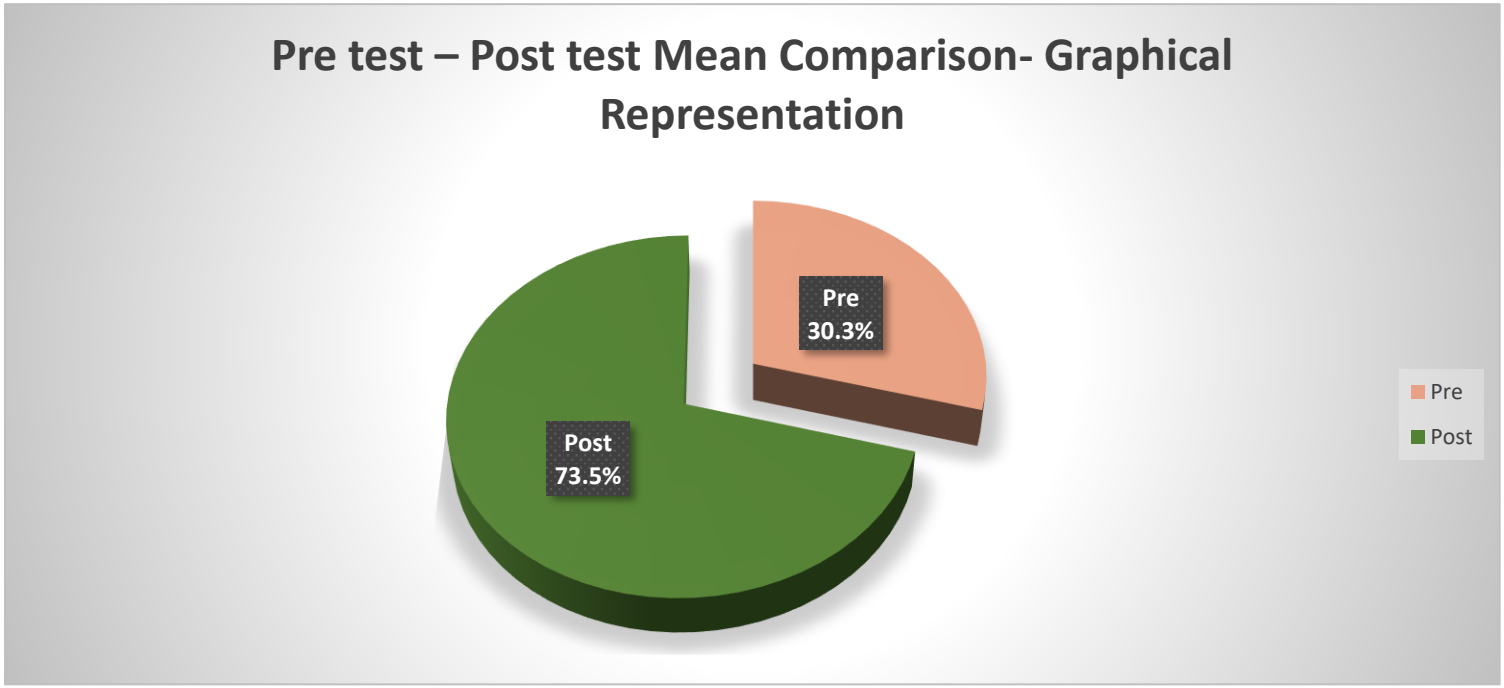

Pre-test and Post test scores of the overall sample
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Pre test marks in percentage (X)
Post test marks in percentage (Y)

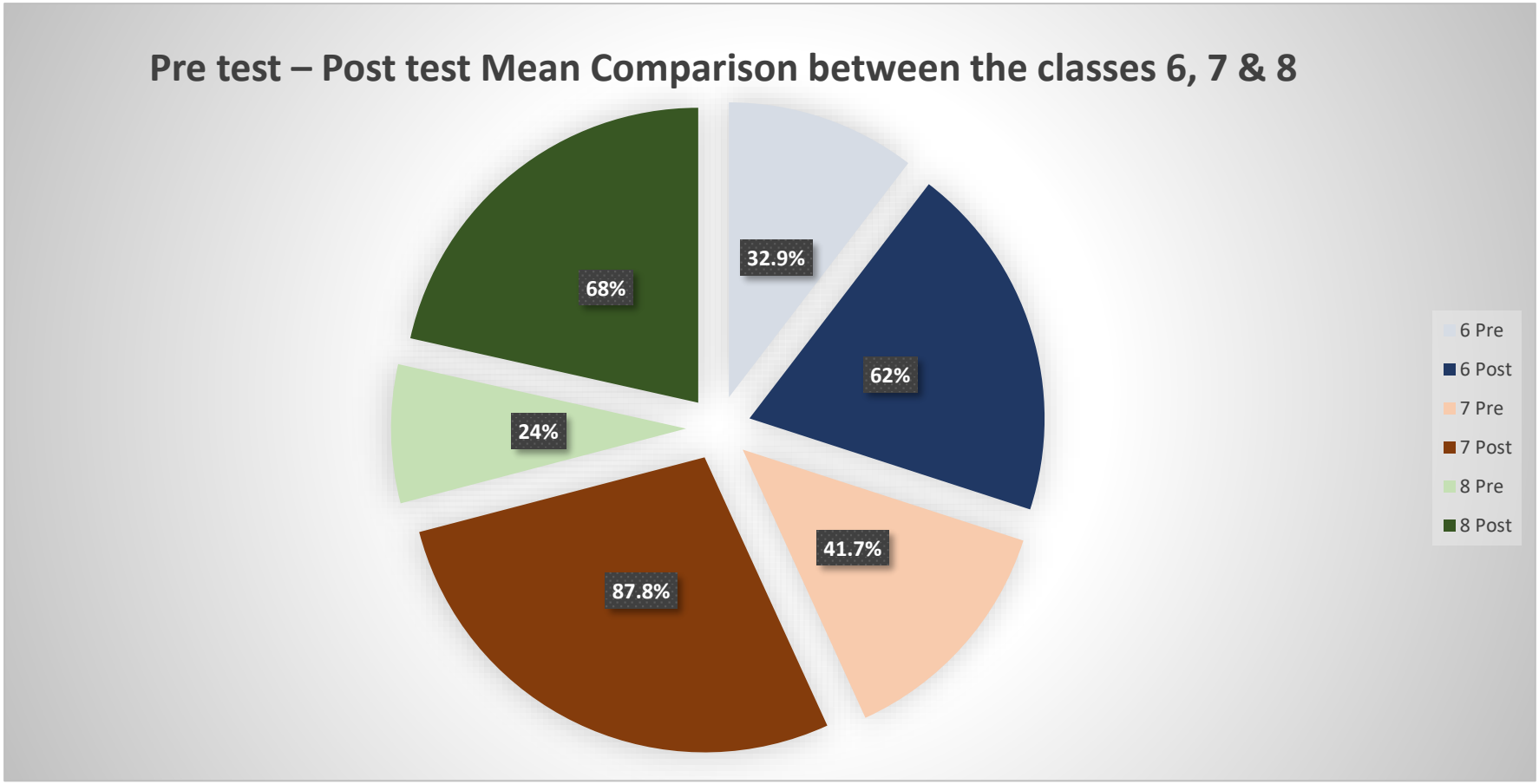
Table VIII

Pre test – Post test Mean Comparison of the Overall sample

Test	Number of Students	Mean
Pre	16	30.3
Post	16	73.5



Pre test – Post test Mean Comparison between the classes 6, 7 & 8



X. Findings

The action research at Municipal Middle School, Vellakarai Road in Sattur, demonstrated significant improvement in understanding the structure and functions of cells and cell components through word wall activities. Their pre- test average of 30.3% increased to 73.5% in the post-test, representing a remarkable gain of 43.2%. The investigator found that Class 7 (87.8%) outperformed the other classes, Class 6 (62%) and Class 8 (68%).

While the research suggests the Word Wall intervention holds promise for fostering positive learning outcomes (improved understanding and vocabulary acquisition), further exploration is necessary. This action research adds valuable insights for educators seeking practical and impactful tools to promote student success in cell biology education. The Word Wall, with its visual appeal, interactive elements, and ability to cater to diverse learners, offers a promising approach to bridge the gap between abstract concepts and student comprehension.

XI. Net Gains of the Present Effort

1. **Sparked Curiosity:** The multifaceted approach, including diverse cell examples, captivating visuals, and the unifying concept of cells, piqued student interest in the captivating world of cell biology.
2. **Enhanced Understanding:** Interactive booklets equipped students with a strong foundation for cell exploration. Clear visuals paired with informative explanations demystified cell organelles and their functions.
3. **Deepened Knowledge:** Transformed classroom walls served as a constant source of information, promoting passive learning and familiarity with cell structures and functions. Visually compelling charts not only refreshed memory but also encouraged further exploration and questioning.

4. Empowered Learners: The self-directed recording activity fostered active learning, allowing students to learn at their own pace, strengthen memory through active recall and repetition, and solidify their understanding of key cell concepts.

Overall Impact: This action research effectively cultivated student curiosity in biology, fostered a deeper understanding of the fundamental building blocks of life (cells), and empowered students to take ownership of their learning journey.

XII. Summary of Action Research

This action research investigated the potential of a strategically designed Word Wall to enhance upper primary students of Municipal Middle School, Vellakarai Road, Sattur in understanding of cell structure and function. Recognizing the inherent challenges students face due to the abstract nature of these concepts and unfamiliar vocabulary, the action research implemented a visually appealing Word Wall featuring key terms, clear definitions, and interactive elements like movable cards or tabs. Pre- and post-tests were administered alongside engaging activities to assess the intervention's effectiveness in improving student learning and understanding. The results of the action research suggested that the Word Wall intervention holds promise in fostering positive learning outcomes. While further research with a larger sample size and diverse contexts is warranted to solidify these findings, this action research adds valuable insights into the potential of Word Walls as a practical and impactful pedagogical tool in promoting student success in cell biology particularly cell structure and functions. The potential of a strategically designed Word Wall to empower upper primary students in grasping the complexities of cell structure and function. Recognizing the inherent challenges students face – abstract concepts and unfamiliar vocabulary – the research implemented a visually appealing Word Wall as a pedagogical tool.

Bibliography

- Standard VI Science text book published by NCERT
- Standard VII Science text book published by NCERT
- Standard VIII Science text book published by NCERT
- Standard VI Science text book published by DSE, Tamil Nadu
- Standard VII Science text book published by DSE, Tamil Nadu
- Standard VIII Science text book published by DSE, Tamil Nadu
- Cooper, J. D. (2000). Visualizing the invisible: Using classroom-based technology to illustrate cell structure. The Science Teacher, 67(7), 54-57.
- Cunningham, D. J., & Moeller, G. H. (2006). Teaching reading: The science of word identification. Houghton Mifflin Harcourt.
- Silverstein, D. (2014). Cell lab: The inside story of the smallest unit of life. National Geographic Books.

Webliography:

- https://www.readingrockets.org
- https://www.labx.com/
- https://mysteryscience.com/
- https://www.dkfindout.com/
- https://www.genome.gov/
- https://www.spedellreadingtrategies.org
- https://www.wordwall.net.comunity
- https://www.learningforjustice.org
- https://www.primaryconnections.org

ACTION RESEARCH ABSTRACT - 2024

1. Research Title:

Removing the obstacles in understanding the structure and functions of cell and cell components among upper primary students through Word Wall.

2. Name & DIET of the Researcher:

Dr G. Thanalakshmi
Senior lecturer
DIET, Palayampatti, Virudhunagar District

3.Need and Significance of the Study

The difficulty level of the concepts in teaching and learning of cell and cell components was brought into notice and observed during school visit. Also the classroom observations made by the investigator helped to recognize the problem. Cells are the basic structure of all living organisms. Cells provide structure for the body, take in nutrients from food and carryout important functions. Hence the investigator planned to incorporate suitable instructional strategy like word walls to understand the structure and functions of cell and cell components among upper primary students. So the investigator selected this topic for the action research.

4. METHODOLOGY

a. Objectives

- To investigate the impact of a Word Wall on upper primary students' understanding of cell structure and function.
- To identify specific cell-related concepts where the Word Wall demonstrably improves student comprehension.

- To examine the impact of the Word Wall on students' vocabulary acquisition in cell biology.
- To assess students' retention of information related to cell structure and function through delayed post-intervention assessments or recall tasks.
- To explore the potential of the Word Wall to facilitate the development of problem-solving skills in cell biology.

b. Method of Experiment

This action research investigates if a visual and interactive **Word Wall** can improve understanding of challenging science concepts and ignite a passion for cell biology in young learners, empowering educators.

c. Tool

Pretest and post test questionnaire

d. Sample

All the Upper Primary students (16) of Municipal Middle School, Vellakarai Road, Sattur

e. Statistical techniques used

Mean score Analysis

5. Findings

The action research at Municipal Middle School, Vellakarai Road in Sattur, demonstrated significant improvement in understanding the structure and functions of cells and cell components through word wall activities. Their pre- test average of 30.3% increased to 73.5% in the post-test, representing a remarkable gain of 43.2%.

6. Net Gains of the Present Effort

- **Sparked Curiosity:** The multifaceted approach, including diverse cell examples, captivating visuals, and the unifying concept of cells, piqued student interest in the captivating world of cell biology.

- **Enhanced Understanding:** Interactive booklets equipped students with a strong foundation for cell exploration. Clear visuals paired with informative explanations demystified cell organelles and their functions.
- **Deepened Knowledge:** Transformed classroom walls served as a constant source of information, promoting passive learning and familiarity with cell structures and functions. Visually compelling charts not only refreshed memory but also encouraged further exploration and questioning.
- **Empowered Learners:** The self-directed recording activity fostered active learning, allowing students to learn at their own pace, strengthen memory through active recall and repetition, and solidify their understanding of key cell concepts.

Overall Impact: This action research project effectively cultivated student curiosity in biology, fostered a deeper understanding of the fundamental building blocks of life (cells), and empowered students to take ownership of their learning journey.

மாவட்ட ஆசிரியர் கல்வி மற்றும் பயிற்சி நிறுவனம், பாலையம்பட்டி

செயலாய்வு – 2024

முன் தேர்வு / பின் தேர்வு

பள்ளி : ஊராட்சி ஒன்றிய நடுநிலை பள்ளி , வெள்ளக்கரை ரோடு சாத்தூர்

வகுப்பு: 6 முதல் 8 வரை **மதிப்பெண்: 30**

I. கொடுக்கப்பட்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்வு செய். **(10 X 1 = 10)**

1உயிரினங்களின் அடிப்படையாக உள்ளது

அ.செல்

ஆ . புரோட்டோப் பிளாசம்

இ. உட்கரு

ஈ . செல்லுலோஸ்

2.தாவர செல்லின் செல் சுவர் முக்கியமாக எதனால் உருவாக்கப்பட்டுள்ளது

அ.புரதம்

ஆ. செல்லுலோஸ்

இ.லிப்பிட்

ஈ. ஸ்டார்ச்

3 . லைசோசோம்கள் தற்கொலை பைகள் என்று அழைக்கப்படுவதற்கு காரணம்

அ.ஒட்டுண்ணி செயல்பாடு

ஆ. உணவு குமிழ் உள்ளதால்

இ.ஹைட்ரோலைடிக் செயல்பாடு

ஈ. வினையூக்கி செயல்பாடு

4. நான் ஒரு விலங்கு செல்லின் வெளிப்புற அடுக்கு. நான் யார் ?

அ .செல் சுவர்

ஆ. உட்கரு

இ . செல் சவ்வு

ஈ. உட்கரு சவ்வு

5 . செல்லின் மூளையாக செயல்படும் செல்லின் பாகம் எது?

அ .லைசோசோம்

ஆ .ரைபோசோம்

இ .மைட்டோகாண்ட்ரியா

ஈ . உட்கரு

6. செல் உறுப்புகள் பிளாஸ்மா சவ்வுக்குள் உள்ள ஜெல்லி போன்ற பொருளில் மிதக்கின்றன. அந்த ஜெல்லி போன்ற பொருள்

அ . சைட்டோபிளாசம்

ஆ. டோனோ பிளாசம்

இ. கார்யோபிளாசம்

ஈ. செல் திரவம்

7. செல்லின் ஆற்றல் மையம் என்று அழைக்கப்படுவது

அ. செல் சுவர்

ஆ. மைடோகாண்ட்ரியா

இ. ரிபோசோம்

ஈ. உட்கரு

8.கீழ்கண்டவற்றுள் குளோரோபிளாஸ்ட் காணப்படுவது

அ. தாவர செல்லில் மட்டுமே

ஆ. விலங்கு செல்லில் மட்டுமே

இ . நரம்பு செல்லில் மட்டும்

ஈ. விலங்கு மற்றும் தாவர செல்கள் இரண்டிலும்

9 . கோழியின் முட்டை ஒரு

அ. செல்

ஆ. திசு

இ. உறுப்பு

ஈ .உறுப்பு மண்டலம்

10 . உட் கருவுக்கும் சைட்டோபிளாஸத்துக்கும் இடையே உள்ள பொருட்களின் பரிமாற்றம் _____ மூலம் மேற்கொள்ளப்படுகிறது.

அ. எண்டோபிளாஸ்மிக் வலைப்பின்னல்

ஆ. உட்கரு துளைகள்

இ. நுண்குமிழிகள்

ஈ. உட்கரு உறை

II. கோடிட்ட இடத்தை நிரப்புக. (5 X 1 = 5)

1. ஒரே மாதிரியான அமைப்பு கொண்ட செல்களின் தொகுப்பு _____ ஆகும்.

-2. _____ செல் பகுப்பிற்கு உதவுகிறது.

3 . செல்லில் உள்ள ஜெல்லி போன்ற பொருள் _____ என்று அழைக்கப்படுகிறது.

4 . நான் தாவரத்தில் சூரிய ஆற்றலை உணவாக மாற்றுவேன் .நான் யார் ?

5 . முதிர்ந்த ரத்த சிவப்பு செல்லில் _____ இல்லை.

III. சரியா / தவறா (5 X 1 = 5)

1. தாவர செல்கள் விலங்கு செல்களை விட அளவில் பெரியவையாகவும் கடினத் தன்மை மிக்கதாகவும் உள்ளன.

2. தாவர செல்களில் செனட்ரியோல்கள் உண்டு.

3. நுண்குமிழ்கள் செல்லின் சேமிப்பு கிடங்கு ஆகும்.

4. ஒவ்வொரு விலங்கிலும் செல்லின் அளவு வேறுபடுகின்றது .

5. செல்களை நேரடியாக வெறும் கண்களால்பார்க்க முடியாது.

IV. பொருத்துக. **(5 X 1 = 5)**

1. செல் சுவர்	--	செல்லின்நகரும் பகுதி
2. சைட்டோபிளாசம்	-	-சேமிப்பு கிடங்கு
3. பசுங்கணிகம்	-	செல்லின் கட்டுப்பாட்டு மையம்
4. நுங்குமிழ்கள்	-	செல்லின் ஆற்றில் மையம்
5. உட்கரு	-	செல்லின் உணவு தொழிற்சாலை
	-	பாதுகாப்பவர்

V. கொடுக்கப்பட்டுள்ள படத்தில் தாவர செல்லில் ஏதேனும் ஐந்து பாகம், விலங்கு செல்லில் ஐந்து பாகங்களை குறிக்கவும். (10 **X 1/2 = 5)**