The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 3 | Issue 11 | November 2025
ISSN: 2583-973X (Online)
Website: www.theacademic.in

Overcoming Difficulties in Memorizing Periodic Table in Chemistry at High School Level - An Action Research

Dr. Elizabeth Joshua

Assistant Professor, Peet Memorial Training College, Mavelikara, Kerala, manjunithya625@gmail.com

Devika C

Primary School Assistant, National Public School, Gangavaram, Palamaner, devika4140@gmail.com

DOI : https://doi.org/10.5281/zenodo.17914965

ARTICLE DETAILS

Research Paper

Accepted: 17-11-2025

Published: 10-12-2025

Keywords:

Periodic Table, Mnemonic methods, Acrostics, Rhymes, Story Telling, Flashcards, Colours and Pictures, Chunking.

ABSTRACT

Chemistry is essential in science, especially in the domains of life sciences, physical sciences, and technological growth. It is regarded as one of the most significant subject for understanding the foundations of science. Chemistry education can help to address the world's current environmental concerns. The periodic table is one of the most fundamental and basic concepts in chemistry. The periodic table is an essential tool for teaching and understanding chemistry. According to many pupils, understanding the Periodic Table is hard and complicated. One major issue that students experience when learning the periodic table is memorizing all of the Elements. This small-scale action research investigates the students' "Difficulties in Memorizing the Periodic Table in Chemistry among High School Students". In this study, an Action Plan was created using mnemonic methods such as acrostics, rhymes, storytelling, flash cards, Chunking and Colours and Pictures. Various strategies encourage the learners to participate, connect, and be excited about the subject being provided. The study included 52 students from the IX-B class at Govt Girls High School in Mavelikara. The students' "Pre-Test and Post-Test Scores" were collected and evaluated. Comparing the scores revealed positive advancement and better improvement in the students' performance.

INTRODUCTION

Action research is a research method that seeks to both study and solve a problem immediately. In other words, as the name implies, action research combines research and action. Lewin invented the word in 1944. It is particularly popular among educators as a method of systematic inquiry because it emphasizes contemplation and bridges the gap between theory and practice. Because of the nature of the investigation, it is also sometimes referred to as a cycle of action or cycle of inquiry.

Action research is frequently used to effect change in practice while also producing information. These combined properties make it suitable for exploratory study aimed at improving practice or proposing novel solutions to practical challenges. Action research is typically conducted in discrete cycles, with subsequent cycles serving to question, reinforce, and refine insights and outcomes from previous cycles. When used correctly, the cyclic feature of action research can be used not just to suggest theory but also to test it.

Chemistry is a field of science that examines the characteristics, properties and the structure of substances which are referred to as elements and compounds as well as the changes they go through and the energy that is absorbed or released during them. The progress of a country greatly depends on chemistry education. Chemistry education becomes a force for advancement through addressing environmental issues, meeting industrial demands, and improving scientific understanding and research capacities.

The periodic table, a meticulously mapped out diagram that groups all known elements according to their atomic number, electron configuration, and recurrent chemical characteristics, is comparable to the blueprint of chemistry. Arranging elements according to their atomic number, electron configuration, and recurrent chemical characteristics is one of the periodic table's main purposes. Chemists may recognize trends and patterns in the behaviour of elements thanks to this systematic arrangement, which also serves as a foundation for anticipating the behaviours of as-yet-undiscovered elements and directing experimental study.

One of the most important discoveries in the history of chemistry is the periodic table. It is replete with patterns that aid in our understanding of the surrounding environment. A lot of the goods and medications we use today would not be possible without it. We have been able to learn a great deal about the universe we live in thanks to the knowledge obtained from the periodic table. The names, atomic weights, atomic numbers, and symbols of all known elements are included in the Periodic Table. It is an

excellent resource for chemistry problem solving. Therefore, a periodic table is a crucial tool for helping people remember and retain important facts about the elements. Since this idea is so crucial, students who struggle to understand it will become disinterested and less motivated to learn chemistry as a subject. Students' academic performance may be indirectly impacted by this, particularly in Chemistry. Therefore, it is very important to make the students to learn this periodic table using alternative methods.

NEED AND SIGNIFICANCE OF THE STUDY

Chemistry is a very fascinating topic of study. Chemistry is so vital to our world that it affects practically every element of our existence. Chemistry exists everywhere. Every day, it influences what we see, hear, smell, taste, and feel. Learning chemistry will provide a completely new insight of how our world operates. Anything that contains matter degrades into chemical building units. If chemistry did not exist, we would not comprehend why leaves change color in the fall, how food is produced and preserved, how medications or drugs are used, how reactions occur around us, why particular metals are used for different purposes, why we breathe oxygen, and so on. And there's always some chemical reaction that affects us in one way or another. It is safe to say the world would be a more mysterious place without it

The periodic table groups elements according to their related properties, allowing us to determine an element's characteristics simply by looking at its location on the table. Prior to the discovery of all naturally occurring elements, the periodic table was used to forecast the chemical and physical properties of elements in the gaps on the table. However, the table can now be used to forecast the properties of yet to be discovered elements; however, all of these new elements are highly radioactive and rapidly decay into more comparable elements.

The periodic table organizes elements by atomic number, electron configuration, and chemical characteristics, making it easy to study and compare them. Scientists can predict element qualities such as reactivity, electronegativity, and atomic radius by observing patterns in the periodic table. Gaps in the periodic table show missing elements, prompting scientists to seek out and discover new elements to complete the table. In addition, the periodic table is an important educational tool for chemistry students because it depicts the elements and their interactions visually. Understanding the properties of elements as arranged in the periodic table is critical for many industries, including pharmaceuticals, materials science, electronics, and agriculture.

Overall, the periodic table is critical to furthering our understanding of chemistry and the natural world. The periodic table is essential for organizing and comprehending the properties of elements. Its significance stems from the fact that it provides a systematic framework for studying elements and their connections, so aiding advances in chemistry, physics, and materials research.

The study of handling a large number of elements is critical for understanding the periodic table. The periodic table is extremely useful in learning chemistry. This study can help practicing teachers to teach chemistry more successfully and captivate students' attention using mnemonics. It might pique the learners' interest in the field of chemistry.

OBJECTIVES OF THE STUDY

The objectives of the study are as follows :

- To find out whether Secondary School Students have Difficulties in Memorizing the Elements of the Periodic Table.
- To develop a Plan of Action for Overcoming Difficulties in Memorizing the Elements of Periodic Table.
- To improve the Understanding about the Elements in Periodic Table using Mnemonics.
- To develop Students' Ability in Memorizing the Elements of Periodic Table.

HYPOTHESIS OF THE STUDY

The plan of action will help to remember the elements of periodic table in chemistry and hence to memorize them adequately.

METHODOLOGY IN BRIEF

The Action Research titled "Overcoming Difficulties in Memorizing Periodic Table in Chemistry at High School Level" sought to build and improve students' recollection of the periodic table. The action research was conducted among the Ninth Standard Students. In this study, a Pre-Test was administered to identify children who are having difficulty in memorizing the Periodic Table in ninth grade. The test was given to 52 pupils in Class IX-B of Govt. Girls' H. S. S, Mavelikara and it was based on the chapter 'Periodic Table'. The pupils were then given a post-test after being taught using the tactics and instructions given. The identical set of questions were used for both the Pre-Test and the Post-Test. In the context of the Pre-Test, 17 out of 52 pupils excelled at memorizing the periodic table elements. 21 kids were almost able to answer questions about the periodic table.14 pupils were chosen as samples because

they had low marks on the pre-test. It demonstrates that they lacked basic and prerequisite understanding of the Periodic Table and were afraid of the periodic table, it's properties and problems associated with it. They had significant difficulty in memorizing the Periodic Table. After identifying the problem, the investigator devised an action plan that included the use of various mnemonic devices such as acrostics, rhymes, storytelling, flashcards, colours and pictures, and chunking with the use of teaching aids as remedial tools. The student gradually improved his capacity to memorize the periodic table in chemistry. The Post-Test was conducted following the implementation of the required action plans. The post-test served to determine whether the technique used was beneficial, where further improvements should be made, and whether the child improved in memorizing the Periodic Table and solving Periodic Table issues. In this study, percentage analysis was utilized to compare and analyse whether pupils' performance improved after following the plan of action.

RESULTS AND DISCUSSION OF THE STUDY

Investigator observed learning Difficulties in Memorizing the Periodic Table in Chemistry among Ninth standard students. Thus, a Pretest was conducted to find the main area of difficulty. After the

SL No	Name	Percentage of pre-Test mark	Percentage of post-Test mark
1	Adithya S	12%	80%
2	Aiswarya Reghu	4%	60%
3	Anikha Rajeev	12%	72%
4	Arsha Abhilash	16%	84%
5	Ashwini Nibin	8%	72%
6	Athira K R	8%	68%
7	Devinandhana S	4%	56%
8	Lekshmi Ratheesh	20%	92%
9	Niranjana P	12%	80%
10	Parvathy Omanakuttan	16%	76%
11	Sikha Syam	4%	64%
12	Sreelakshmi B	16%	80%
13	Vaika Rajesh	8%	64%
14	Vaishnavi R	8%	68%

implementation of Action Plan, a Post- Test was also conducted. A comparative study is beneficial for understanding the improvement in any field. In Action Research, the score percentage of pre-test and post-test are compared in order to evaluate the results of this action hypothesis.

Table 1. *Comparison of percentage of pre-test and post-test*

After comparing the percentage of marks in the pre-test and post-test, it has been found that there is an improvement in memorizing the periodic table. Table 1.1 shows the comparison of percentage of pre-test and post-test scores of the selected 14 students. From this table, the investigator uncovered that all the 14 students showed a considerable difference of more than 50% between their post-test and pre-test marks. There was a huge progress on the part of students and this shows the effectiveness of action Plan implemented. It implies a rapid growth of knowledge took place during the classroom. Some of the students also secured 80%, 84% and even 92% in their Post test. Everyone scored more than 55% in the Post-test. Students were able to identify their difficulties and able to overcome it.

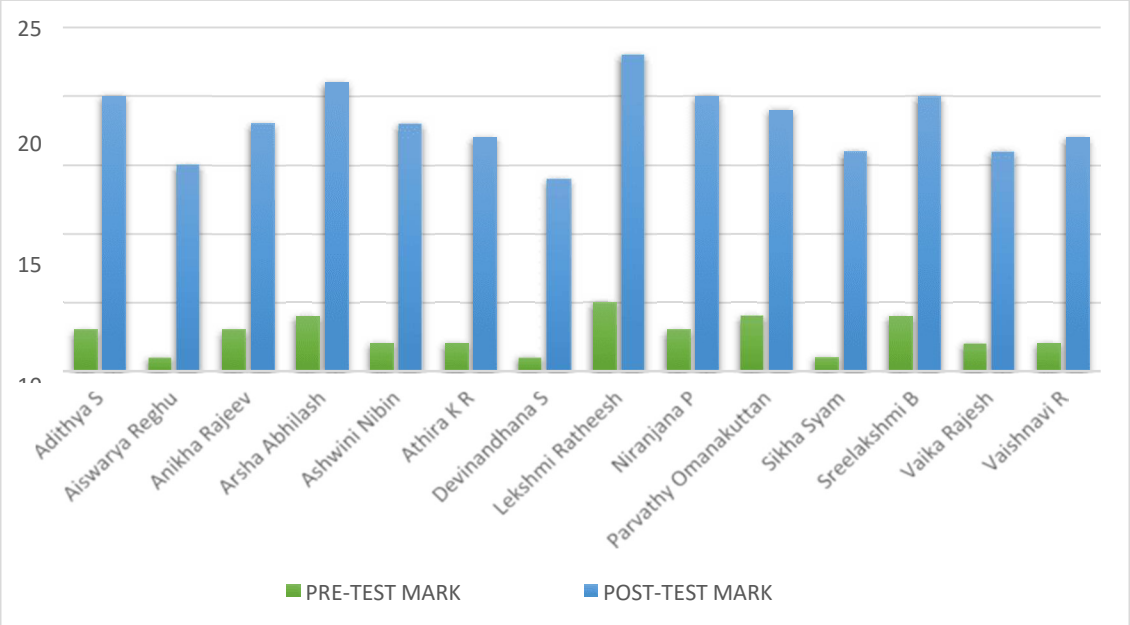

Figure 1: Comparison of Pre-test and Post-test Scores

bar diagram is constructed as a part of this study to represent the scores of pre-test and post-test. The names of 14 students chosen are given on the X axis and the marks they scored in the pre-test and post-test are given on the Y axis. The two bars correspond to each student shows their levels in pre-test and post-test. The green bars show the marks scored in the pre-test and blue bars shows marks scored in the post-test. The progress of the students in memorizing the elements of the Periodic Table is clearly depicted with the help of this bar diagram.

EDUCATIONAL IMPLICATIONS

1. This study encourages teachers to approach students' concerns in a scientific manner.
2. This study will be essential for teachers to identify the learning issues of their students.
3. This project established a democratic environment in which teachers and students collaborated to comprehend and solve periodic table-related challenges
4. This study contributes to raising students' aspirations and performance levels, as well as improving educational methods.

CONCLUSION

Chemistry is fundamental to our life and sheds light on how we interact with the world around us, from the air we breathe to the food we consume. Learning chemistry will provide a new perspective on how our world operates. The periodic table is more than just an orderly tabular arrangement of elements; it is the most important source of information in chemistry. The complexity of the periodic table causes many pupils to struggle with memorizing it. Memorizing the periodic table can be difficult due to the sheer number of elements. It also has unfamiliar symbols and element names. The elements aren't ordered alphabetically, which makes it tougher to memorize. Some symbols and names are similar, causing confusion. All of these factors make students afraid and uninterested in learning periodic Table. A teacher can improve their memorization of the periodic table by using a variety of innovative techniques and procedures. Looking back on all of this study, the first thing that student teachers noticed was that they struggled to memorize the elements of the periodic table, which made it more difficult for them to solve periodic table problems. There is evidence that the mnemonic tactics used helped the students overcome their obstacles. The investigator believed that each student learned something from this procedure and applied it in their own way to improve periodic table memorization. By the end of this Action Research, the investigator found that her pupils were more focused and accurate in solving periodic table questions and using proper mnemonic approaches to learn the periodic table. So, this study was done with the express purpose of boosting the ability to memorize the Periodic Table in chemistry.

REFERENCE

- Greenwood, N. N. (1997). *Chemistry of the Elements*, 2nd Edition, Oxford,Butterworth-Heinemann limited
- Lemmer, M, Morabe, O.N, Djan, Grace. (2022). *Affordances of engagement strategiesin chemistry : learning the periodic table.* Affordances of engagement strategies in chemistry : learning the periodic table (nwu.ac.za)
- Pinaki Chowdhury (2022). *Learners' Misconceptions in Periodic Table: An Analysisof Cognitive Skills Development.* Department of Mathematics, Science and Business Education, Faculty of Humanities, Tshwane University of Technology, South Africa. DOI:10.13189/ujer.2022.100106