

Connecting Science and Technology Through Visual Organizers to Enrich Indian Knowledge System

Mrs. Prabha Devi¹ & Dr. Shalini Singh²

¹Ph.D. Scholar, Department of Teacher Education V.M.L.G. College, Ghaziabad

²Associate Professor, Department of Teacher Education V.M.L.G. College, Ghaziabad

²Email: sshalini_78@rediffmail.com



Received 10 August 2026

Accepted 15 August 2026

Published 27 August 2026

Corresponding Author:

Dr. Shalini Singh

Email: sshalini_78@rediffmail.com

DOI: <https://doi.org/10.64880/tvsjir.v1i3.10>

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sector.

Copyright: © 2026 The Author(s).



This is an open access article under the [Creative Commons Attribution-Noncommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

OPEN ACCESS

Abstract:

Science and technology are two fields that in essence determine how we understand the world and how capable we are of influencing it. Visual organizers act as strong tools for showing the complex relationships and processes that occur in these areas. By means of diagrams, charts, and infographics, visual organizers help people to understand scientific ideas and technological developments by presenting complicated information in a visually accessible format. They are especially good at showing the scientific method, which is a systematic procedure comprising observation, forming a hypothesis, carrying out experiments, and reaching a conclusion. This clarity doesn't just improve understanding but also helps to develop important science process skills such as critical thinking, data analysis, and problem-solving. In the area of technology, visual organizers can show the connections between different fields such as artificial intelligence, machine learning, and data analytics, thus demonstrating how advances in one field affect others. Moreover, visual tools can also include insights from the Indian Knowledge System (IKS), by matching traditional approaches to holistic learning, logical reasoning, and hands-on understanding with the current scientific and technological frameworks. Doing so not only brings out the connection between ancient knowledge and modern investigation but also improves contextual understanding. Finally, the use of visual aids promotes collaborative learning, encourages creativity, and equips future generations to cope with a complicated, technology-based world that is at the same time culturally grounded.

Key Concepts: Science and Technology Indian Knowledge System (IKS), Visual Organizers, Science Process Skills (SPS), Technological Innovation.

1. Introduction:

In the twenty-first century education needs to be interdisciplinary, inclusive and based on cultural contexts. Although science and technology play a dominant role in global knowledge systems, the wisdom contained in indigenous traditions such as the Indian Knowledge System (IKS) still offers important insights into sustainability, health and human development. The problem is to bring together these different epistemologies without losing their authenticity.

Visual organizers such as concept maps, diagrams, timelines, and graphic representations—have become powerful tools for overcoming these gaps. They enable abstract, complex, and culturally specific knowledge to be turned into forms that are easy for learners to understand. The present paper examines how visual organizers can act as a bridge between STEM education and IKS, ensuring that heritage is maintained while at the same time promoting modern scientific research.

2. Key Concepts:

Science and Technology:

Science involves the pursuit of knowledge by means of systematic methods, and technology puts that knowledge into practice to deal with real-world problems. The two together make up the foundation of global innovation and progress.

Indian Knowledge System (IKS):

IKS includes within it the ancient and traditional wisdom of India in various fields such as medicine (Ayurveda), mathematics, astronomy (Jyotisha), philosophy, yoga, and sustainable ecology; its basic principles are based on holistic reasoning, experiential learning, and interconnectivity.

Visual Organizers:

Visual organizers are structured graphic aids such as concept maps, flowcharts, timelines, Venn diagrams, and cycle diagrams, which help learners to understand relationships, hierarchies, and processes. They make use of visual cognition and enable complex material to be understood and remembered more effectively.

Science Process Skills (SPS):

The cognitive and practical skills associated with science are the abilities which allow people to explore, investigate and come to an understanding of various phenomena by means of systematic observation, experimentation, the collection of data and critical analysis. Such skills involve observing, classifying, measuring, inferring, predicting, experimenting, interpreting and communicating the results, all of which are necessary for scientific inquiry and for solving problems.

Technological Innovations:

Technological innovations mean the development and application of new ideas, methods, or devices which either improve existing technologies or lead to the creation of completely new solutions; they consist in putting scientific knowledge and creativity into practice by designing tools, systems, or processes that increase efficiency, productivity, communication, and the quality of life in society.

3. Review of the relevant literature:

As Novak and Cañas (2008) showed, concept maps promote meaningful learning by making explicit the connections between new knowledge and prior knowledge. Mayer's (2014) cognitive theory of

multimedia learning stated that dual-channel learning—through both visual and verbal channels—helps to reduce cognitive overload. Jones and others (2015) stressed that diagrams improve science process skills. The importance of the cultural aspect is emphasized by Indian scholarship. Kapur in 2018 and Sharma in 2021 maintained that the visual depiction of IKS helps to preserve identity at the same time as making it available to modern learners. The NEP 2020 specifically calls for the integration of indigenous traditions into education, which makes visual organizers essential mediators. The literature shows that although visual organizers are effective in the context of science education, their potential for embedding IKS has not been adequately explored, which is why this research has been carried out.

4. The connection between science, technology, and IKS:

Science and technology are generally seen as being modern, whereas IKS is regarded as traditional. However, Indian traditions show a considerable degree of scientific thinking. The Charaka Samhita of Ayurveda made use of classification and empirical observation; the Sulba Sutras studied geometry well before the Greeks; and the Jantar Mantar observatories showed great astronomical accuracy. Visual organizers help to show these similarities. For example, flowcharts can be used to compare Ayurvedic and biomedical diagnoses, and Venn diagrams can be used to link Yogic meditation with neuroscience. Thus, these visual tools demonstrate that IKS is not a separate and isolated tradition but rather a precursor and complement to the global scientific traditions.

5. The role of visual organisers in learning and in preserving IKS:

Visual organizers act as cultural archives since they preserve traditions such as the five elements (Panchamahabhuta), the agricultural cycles, and the Vedic rituals by relating them to modern situations. For instance, a concept map can link Ayurvedic herbs to their biochemical compounds and in this way preserve indigenous knowledge as it promotes pharmacological science.

6. Benefits of Visual Organizers:

Visual organizers help people see connections between ideas. They break down complex information into simpler parts. This makes it easier to remember and understand. Visual tools can help with planning, problem-solving, and decision-making. They support students and professionals in organizing work and tracking progress. Using visual organizers can save time and reduce mistakes. Visual organizers is of great importance in improving learning, understanding and the ability to remember knowledge. When information is presented using charts, diagrams, concept maps and other visual aids, complicated data becomes simpler and more easy to interpret. For students it encourages critical thinking, promotes active involvement and helps with long-term memory retention since the brain deals with visual stimuli more quickly than with written text. In a research setting, visual organizers helps to arrange ideas in a logical way, enables the detection of patterns and reduces cognitive overload, resulting in clearer analysis and more innovative viewpoints. It also contributes to inclusivity by catering to a variety of learning styles, especially those of visual learners. Therefore, incorporating visual organizers techniques into educational and research practices doesn't just increase efficiency but also enhances creativity and problem-solving skills.

7. Types of visual organizers:

• Concept Maps :

Concept maps are one of the most commonly used types of visual organizers, being created to show the relationships between ideas in a hierarchical or network format. They enable learners to see the connections between main topics and the details that support them, thus making abstract concepts more tangible. In research situations, concept maps allow prior knowledge to be combined with new information and as a result encourage higher-order thinking and critical analysis.

For example, The concept map has Cell in the middle and displays its cell organelles by means of branches. Students are able to understand the subject easily and remember the main points in an organized manner.

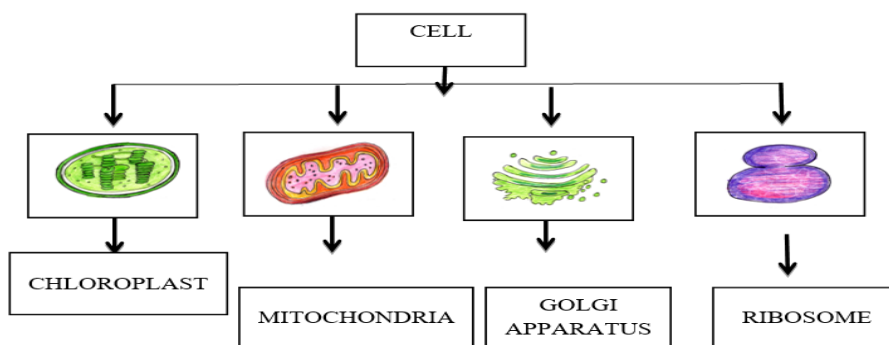


FIGURE: CELL ORGANELLES

• Mind Maps:

Mind maps are visual tools of a non-linear kind which arrange information around a central idea with branches extending out from it. Since they make heavy use of imagery, keywords, and colour coding, they are especially useful for brainstorming, solving problems and engaging in creative thinking. They promote associative learning and are therefore useful in both academic and professional research situations where complex ideas have to be simplified into an understandable format.

For example, a mind map can show relationships between work, energy, kinetic energy, and potential energy. It helps students revise a chapter quickly.

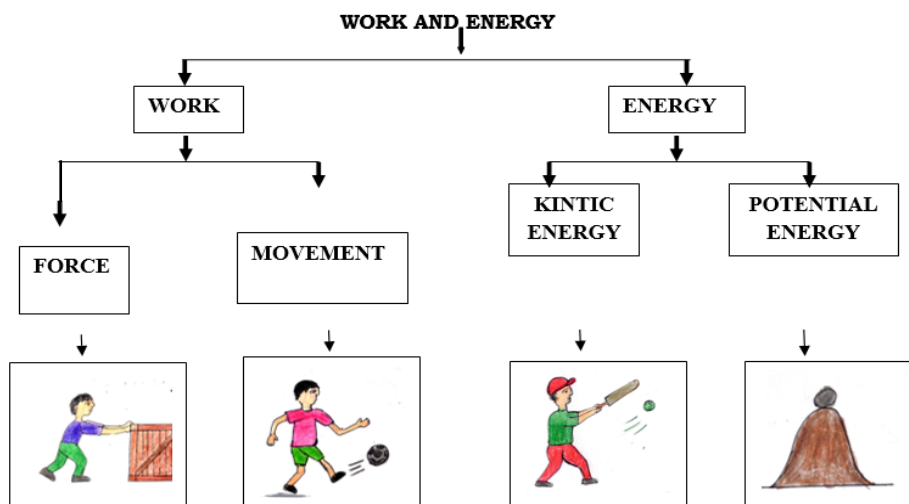


FIGURE : WORK AND ENERGY

• Venn Diagrams:

Venn diagrams are graphical representations which illustrate the logical relationships that exist between sets of ideas, concepts, or items; they are made up of overlapping circles in such a way that the areas where they overlap indicate the similarities and the areas that do not overlap show the differences. Researchers usually use Venn diagrams when comparing and contrasting theories, datasets, or different perspectives in order to achieve greater analytical clarity and accurate classification.

For example, a Venn diagram can be used to compare balanced force and unbalanced force, illustrating them both as types of force and the different effects they have on motion.

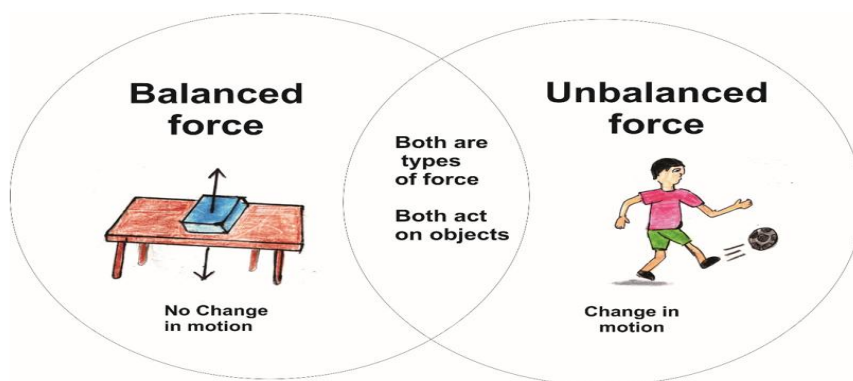


FIGURE: TYPES OF FORCE

• Flowcharts:

Flowcharts are visual tools which present processes, events, or stages in a logical sequence. They are defined by the employment of symbols, arrows, and a directional flow, all of which lead the reader through decision-making or procedural routes. In the context of academic research, flowcharts are very effective at showing methodologies, experimental procedures, or systemic frameworks, thus giving a clear depiction of the processes.

For example, The flowchart illustrates the different states of matter, it begins with Matter and then displays Solid, Liquid and Gas. Ice cubes are given as an example of a solid. Water is given as an example of a liquid. A balloon is given as an example of a gas. The flowchart also indicates the main property of each state and thus makes the subject easy to understand.

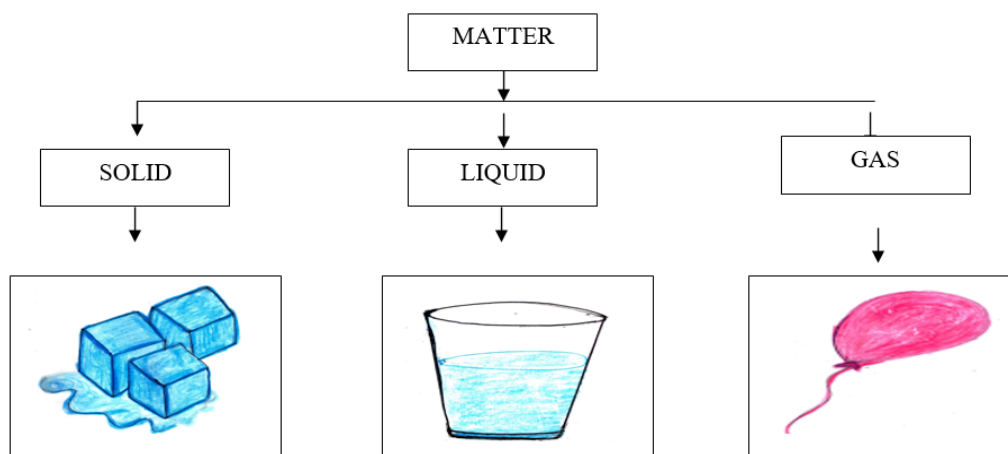


FIGURE: STATES OF MATTER

• Timelines:

Timelines arrange information visually along a chronological scale, allowing learners and researchers to see historical sequences, cause-and-effect relationships, and the way in which ideas or events have evolved. They are especially useful in historical, scientific, and educational research for keeping track of the development of theories, technological innovations, or cultural developments over time.

For Example: A timeline presents the discovery of the cell in chronological order. Each picture represents one key step. The events are listed from the first to the last, which makes it easy to understand and remember the discovery of the cell.

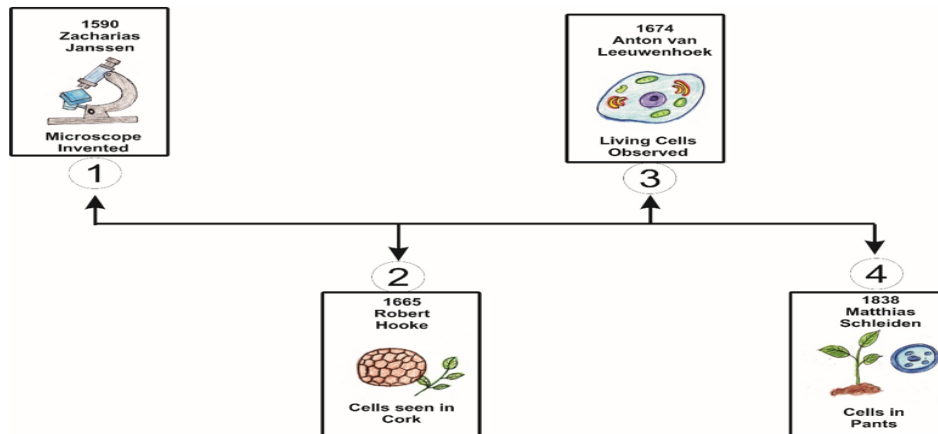


FIGURE: DISCOVERY OF THE CELL

•Spider Map:

This organizer is similar to a spider web in that it shows a main topic linked to related ideas, facts, features, and examples in a clear way. The main topic is placed in the centre and the connected points are written around it using lines or arrows. It enables students to gather, organise, and make meaningful connections between pieces of information. It improves understanding of the concepts and makes learning clearer and more effective. Moreover, a spider map also aids quick revision since all the important points can be seen in one diagram.

For example, the spider map shows the way in which sound travels; it serves as a useful visual aid for effective learning and allows students to easily learn the concept and remember the steps.

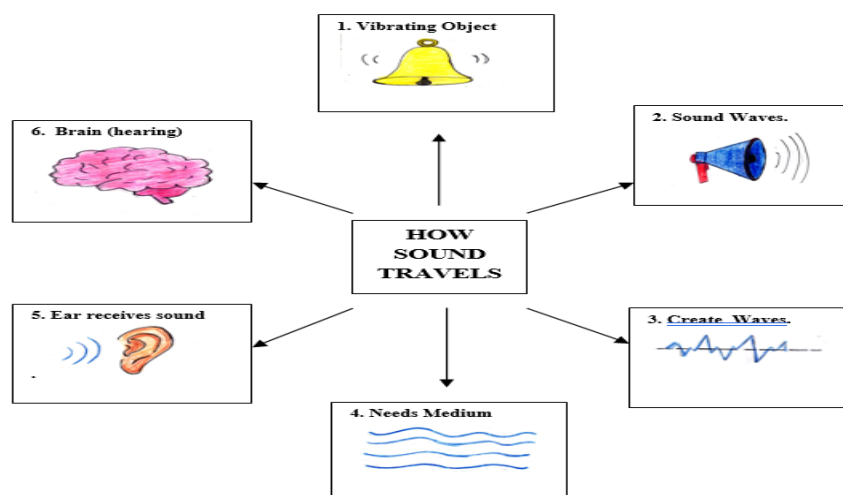


FIGURE: HOW SOUND TRAVELS

•Idea Wheel:

An Idea Wheel is a tool designed to aid creative thinking and helps students to gather and arrange their ideas easily. The central part of the diagram contains the main idea, with various sections surrounding it. Each of these sections deals with one point, feature, or detail connected to the main idea. The diagram is named an Idea Wheel because it looks like a wheel. It is useful for brainstorming and for quick learning, as it enables students to understand a topic clearly and enhances their thinking, planning, and memory skills. The students are able to connect one idea with another. This approach makes learning more interesting and structured, and it also assists with note-taking, revision, and classroom activities.

For example, the Idea Wheel shows the different types of energy; Energy is placed in the middle and each section of the wheel stands for one form of energy, the types being electrical, thermal, sound, solar, chemical and kinetic energy. The pictures help each type to be easily identified. Using the Idea Wheel allows us to learn the subject in a simple and clear way.

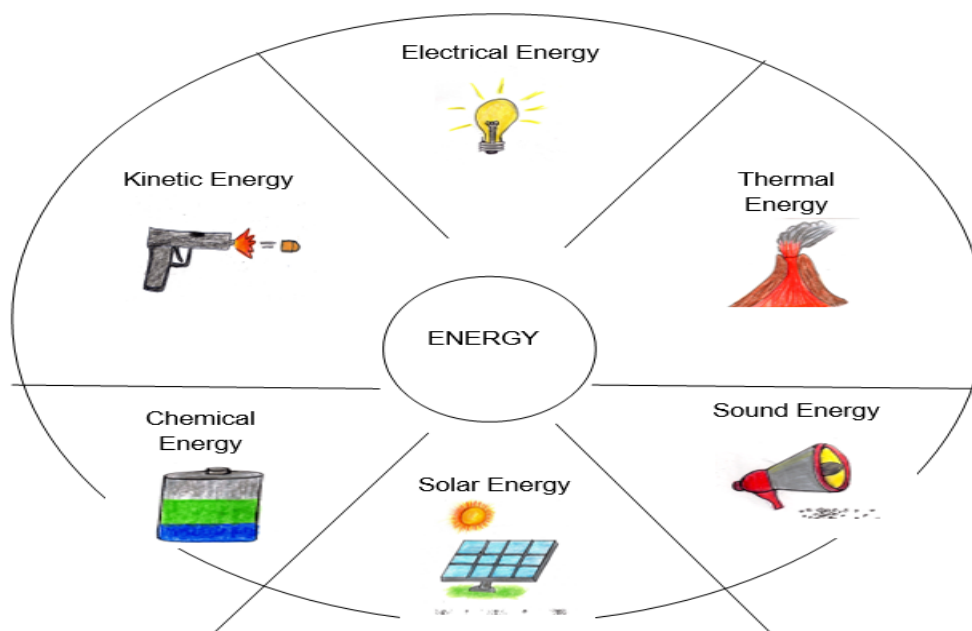
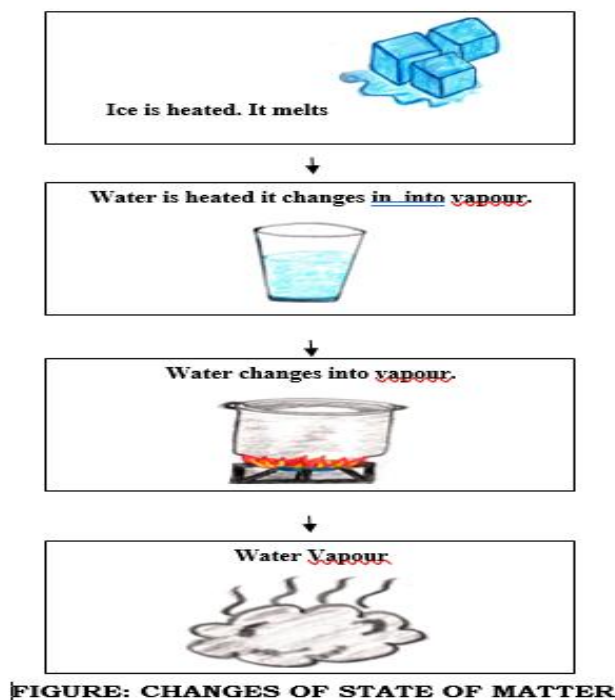


FIGURE: FORMS OF ENERGY

•Sequence of Events Chain:

A sequence of events chain is a visual technique which shows the steps or events in the right order; it is similar to a flowchart in that it explains how one step leads to the next. It makes use of simple boxes, arrows, and other visuals to present the information clearly and helps people to quickly follow a process. Such chains are often used to give an organised explanation of experiments, scientific procedures, and daily activities.

For example, the Sequence Event Chain shows the change of state: we begin with ice, then the ice melts to turn into water, then the water is heated, and last of all the water becomes water vapour. Each stage is depicted in turn and this event chain makes the process easy to understand.



•Tree Chart:

A tree chart presents the information in a clear and systematic way. It enables students to understand broad topics by breaking them down into smaller parts. The chart shows the relationship between the main idea and the related subtopics by means of branches. Each branch stands for a different category or concept. Tree charts are useful in science since they make learning simpler and help it to be remembered more easily. They also aid understanding and allow students to study the topics in a step-by-step manner.

For example, a tree chart helps us to tell the difference between chemical and physical changes. The tree chart below shows the difference between chemical and physical changes together with appropriate examples.

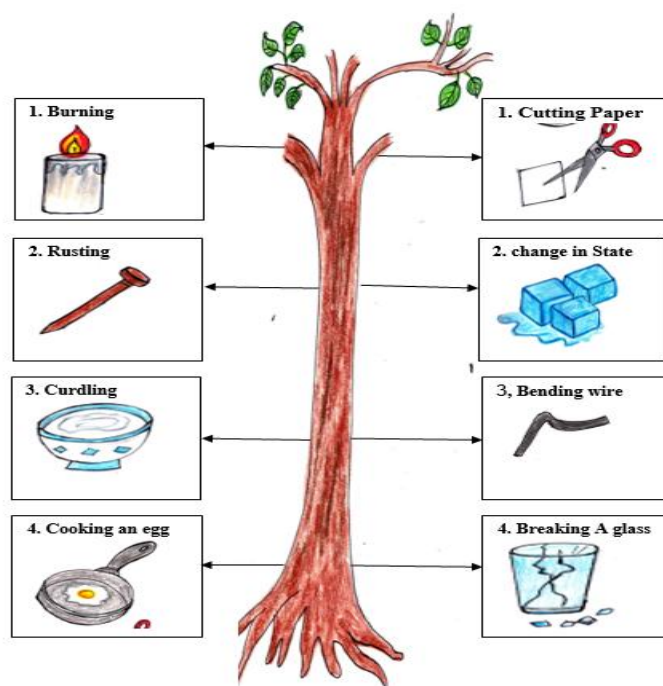


Figure: Chemical and Physical Changes

8. Challenges and Limitations:

Even though visual organizers are becoming more important in connecting science and technology with the Indian Knowledge System (IKS) in today's education, a number of difficulties and limitations still remain. A key difficulty is the integration of traditional ways of knowing with current scientific approaches, since the two are based on different cognitive and methodological approaches. Teachers frequently encounter a lack of preparation in terms of their teaching methods, as they might not have received sufficient training to use visual tools that illustrate both scientific ideas and indigenous knowledge. Furthermore, constraints within the curriculum and the prevalence of standardized assessment methods limit the possibility of experimenting with visual methods, resulting in only a superficial rather than a deep integration. A further important limitation is the lack of genuine resources and digital platforms that present IKS in a form which has been validated scientifically and is suitable for use in teaching. Also, the excessive dependence on technology may disadvantage students from rural or under-resourced areas who do not have easy access to digital tools. Lastly, there is the risk of misrepresenting or oversimplifying Indian traditional knowledge when it is translated into modern visual models, an epistemic issue that calls for careful scholarly involvement and a high degree of contextual awareness.

9. Future Prospects:

The role of visual organizers as a means of linking science, technology and the Indian Knowledge System (IKS) will depend on their ability to promote integrative and interdisciplinary learning. With the development of digital platforms together with VR and AR technologies, visual tools can be turned into dynamic frameworks that combine traditional knowledge with contemporary scientific methods. Future changes to the curriculum and joint research efforts could set up genuine repositories of visual materials, making sure that they are culturally accurate and educationally appropriate. Since innovation is aligned with heritage, visual organizers can function not only as effective teaching aids but also as drivers of cultural preservation, the spread of knowledge and international academic exchange in the 21st century.

10. Conclusion:

Visual organizers are powerful intermediaries that help to preserve, pass on, and combine Indian traditions with global science; they turn learning from one of mere memorisation into a process of meaningful involvement, establishing links between different disciplines and cultures. Although there are some difficulties, there can be no doubt about their potential for shaping a sustainable and inclusive future.

References :

- Cañas, A. J., & Novak, J. D. (2008). Concept mapping: Connecting educators and learners. *Information Visualization*, 6(2), 75–88.
- Deshpande, S. (2019). Integration of indigenous knowledge into modern pedagogy. *Contemporary Education Dialogue*, 16(3), 225–248.
- Gupta, R. (2020). Yoga and neuroscience: Bridging ancient practices with modern science. *Frontiers in Psychology*, 11, 237.

- Jones, M. G., Ruff, C., Snyder, J., & Petrich, M. (2015). Learning science with diagrams. *Science Education Review*, 14(3), 210–225.
- Kapur, M. (2018). Rethinking education with indigenous epistemologies. *Indian Journal of Educational Studies*, 22(1), 15–28.
- Kumar, D. (2016). Traditional water management in India: Lessons for sustainability. *Environmental History Review*, 20(1), 35–50.
- Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning*. Cambridge University Press.
- National Education Policy (NEP). (2020). Ministry of Education, Government of India.
- Pingree, D. (1981). *Jyotihśāstra: Astral and mathematical literature*. Otto Harrassowitz.
- Raina, D. (2003). *Images and contexts: The historiography of science and modernity in India*. Oxford University Press.
- Sharma, A. (2021). Visual pedagogy and the preservation of Indian knowledge traditions. *Journal of Indic Studies*, 4(2), 45–63.
- Singh, S. (2022). Digital futures for indigenous knowledge systems. *Educational Technology Research and Development*, 70(5), 2315–2332.
- Subbarayappa, B. V. (2001). *Science in India: Past and present*. Indian National Science Academy.
- Varma, R. (2004). Technology and Indian traditions: A historical overview. *Technology and Culture*, 45(4), 753–778.
- Wagh, V. (2017). Ayurveda and contemporary science: A comparative review. *Indian Journal of Traditional Knowledge*, 16(4), 645–654

Disclaimer/Publisher's Note: The views, findings, and opinions expressed in this publication are solely those of the author(s). The publisher and editorial team are not responsible for any errors, claims, or consequences arising from the use of the published content.